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Plastics

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POLYTHENE
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Fethaware bucket pedal bin moulded from polythene and Bextrene BC.15 Styrene Alloy by Fraser and Glass Ltd.

in daily use

under exacting conditions

BEXTRENE BC.15

Because of the continual strain imposed on it, Fraser & Glass Ltd. selected Bextrene BC.15 high impact styrene alloy for the lid and base of this bucket pedal bin. Bextrene BC.15 combines great strength and toughness with the excellent finish which lends sales appeal to this new application of plastics in the modern kitchen.

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Here is a first class material for Jerkins at a very competitive price. The very *feel* will tell the knowledgeable fabricator he's "on to" something good.

★ High quality P.V.C. bonded to a warm fleecy lining.

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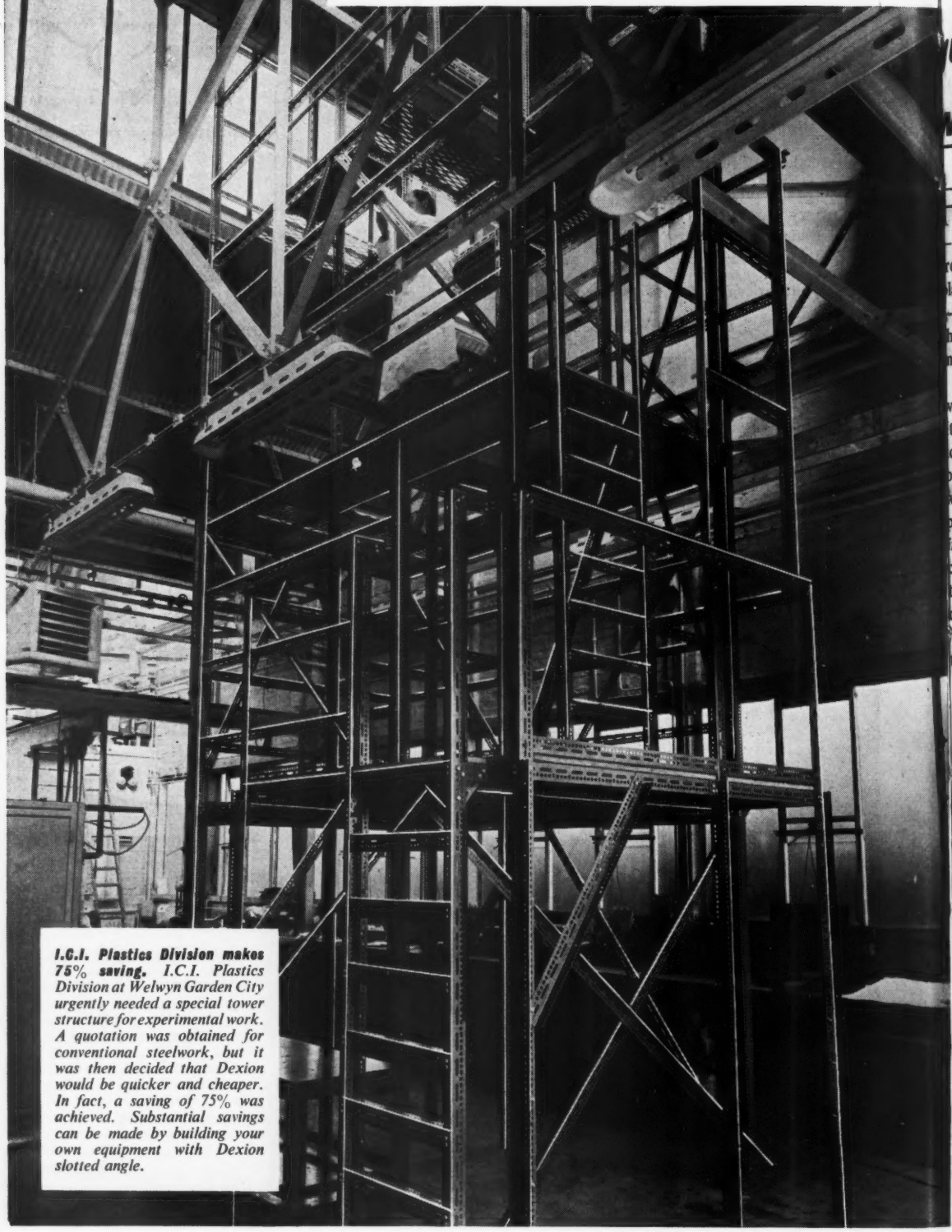
BUILD YOUR



I.C.I. Plastics Division makes 75% saving. *I.C.I. Plastics Division at Welwyn Garden City urgently needed a special tower structure for experimental work. A quotation was obtained for conventional steelwork, but it was then decided that Dexion would be quicker and cheaper. In fact, a saving of 75% was achieved. Substantial savings can be made by building your own equipment with Dexion slotted angle.*

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uickly, cheaply, strongly, exactly as you want it—with versatile DEXION slotted angle

OR almost any kind of works or storage equipment you may need —storage racking, machine-stands, rolleys, work-benches, maintenance latforms, and a hundred other items —you'll find Dexion Slotted Angle he sturdiest, cheapest, most versatile naterial.

Dexion is far easier and quicker to work with than wood or angle iron. t merely needs cutting and bolting ogether — no precise measurements r detailed drawings, no drilling or welding, no skilled carpentry, no painting. *The work has been put into it already*, so that unskilled labour can handle any job. You get exactly the structures you need, without delay, and generally at a big saving.

Dexion is scientifically designed so that every slot and hole has a function, and the remaining metal is left where it gives greatest strength. It *continues* to save you money, because any Dexion structure can be swiftly altered or dismantled and the Dexion used again. There is no waste, no scrap.

Dexion is the Slotted Angle that started an industry. Now, over 75 million feet are being used by more than 45,000 firms all over the world. *And 80 per cent of Dexion sales are repeat orders.*

GET THE FACTS

Dexion 225 is sold in packets of ten 10-ft. lengths, complete with bolts. Steel Dexion (price from 1/3½ to 1/5 per foot) is rust-protected, stove enamelled. Where a light but strong, non-magnetic, non-corroding material is required, use Alloy Dexion (full technical details and prices on request). Dexion Service offers advice or design assistance on any problem, and construction teams are available. Send today for sample piece of Dexion and booklet AR.131 illustrating uses in many industries. Dexion Ltd., 65 Maygrove Road, London, N.W.6 (Phone: MAIda Vale 6031-9).

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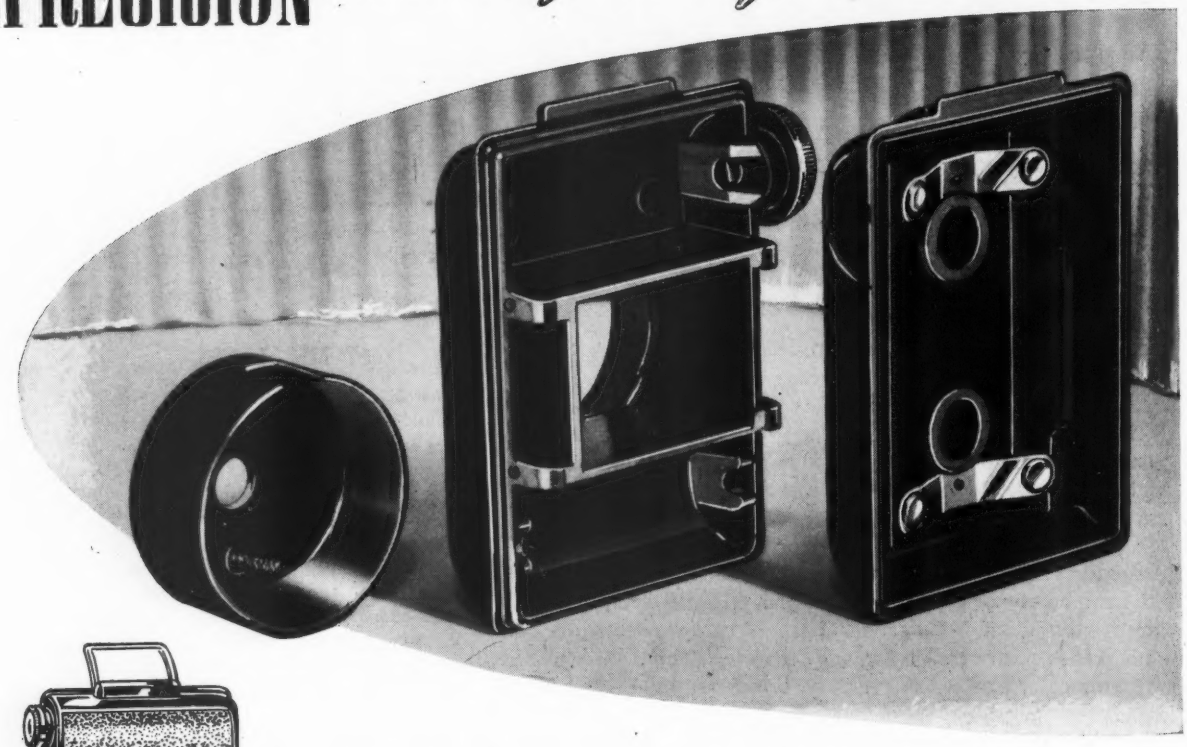
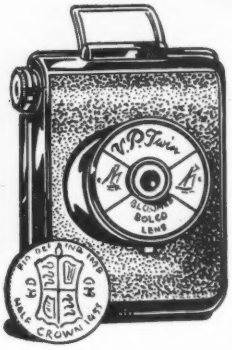
PRECISION *the secret of successful Mass Production*





A low priced article need not necessarily be a shoddy one and this fine little camera, which is claimed to be the cheapest in the world, sets a new standard for mass produced articles. The secret of its success lies in the extreme accuracy of the tools, which not only ensured a perfect finish and performance but also facilitated its quick assembly. In its production we had the co-operation of our subsidiary Company, The British Optical Lens Co., who are specialists in large quantity production of low priced lenses and have full facilities for "blooming".

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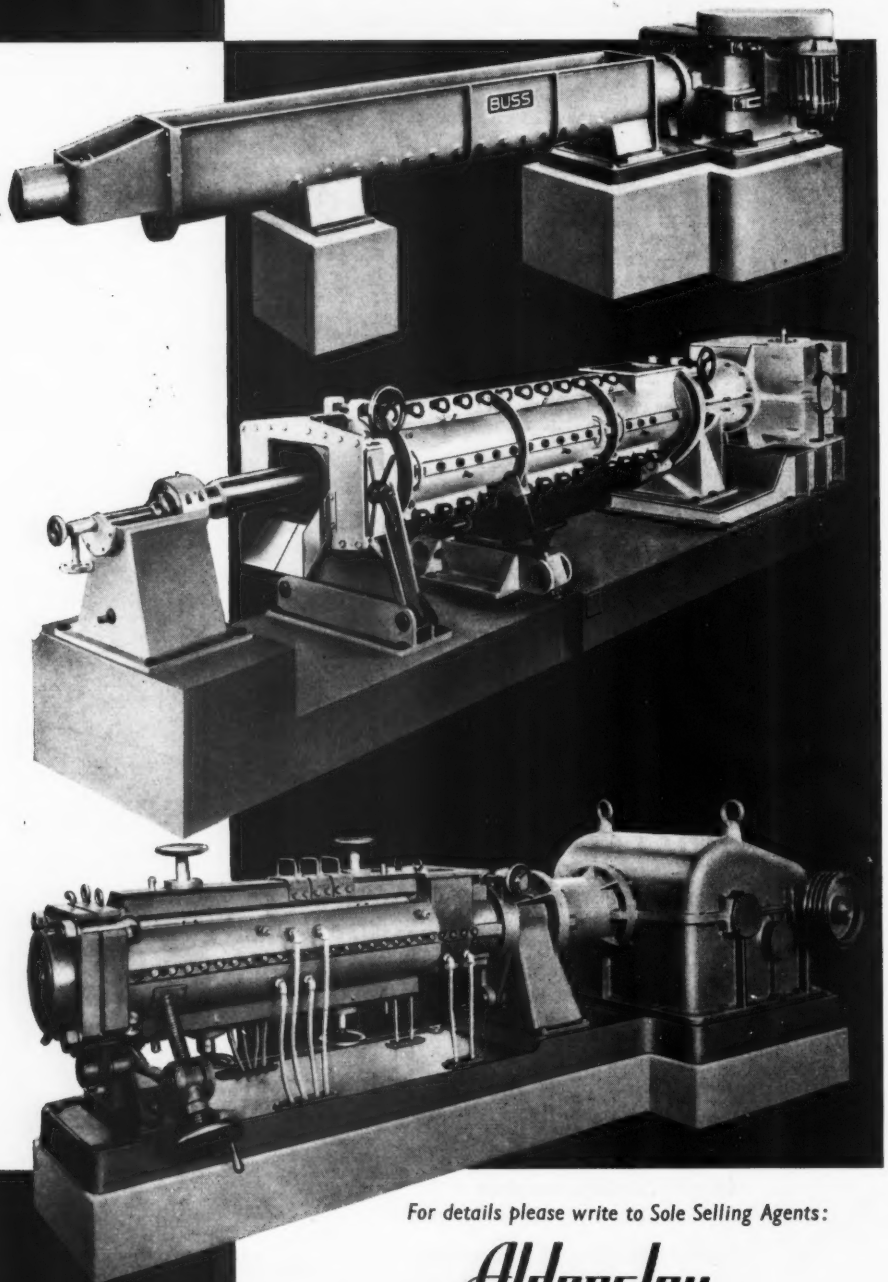

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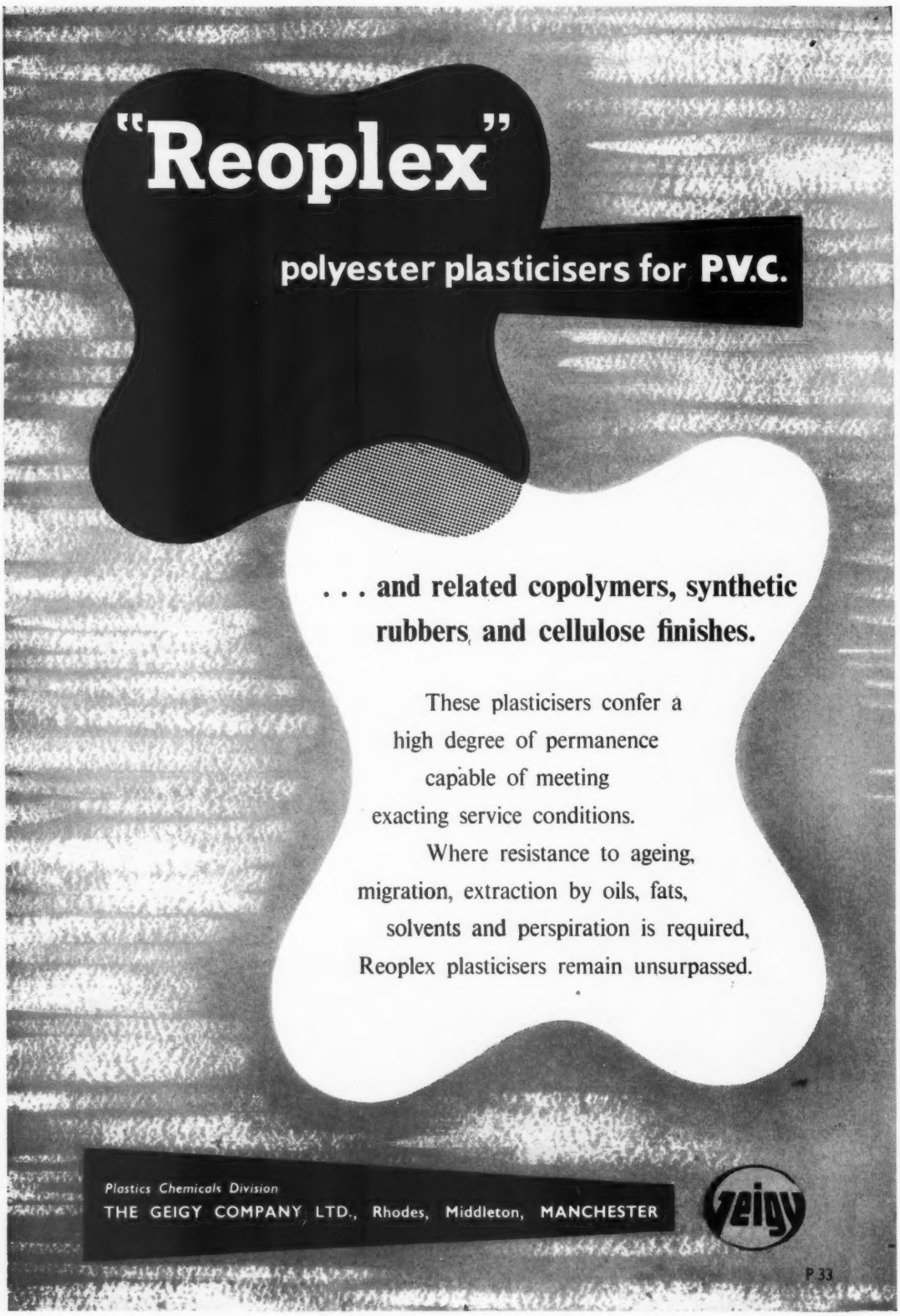
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polyester plasticisers for P.V.C.
. . . and related copolymers, synthetic rubbers and cellulose finishes.
These plasticisers confer a high degree of permanence capable of meeting exacting service conditions.
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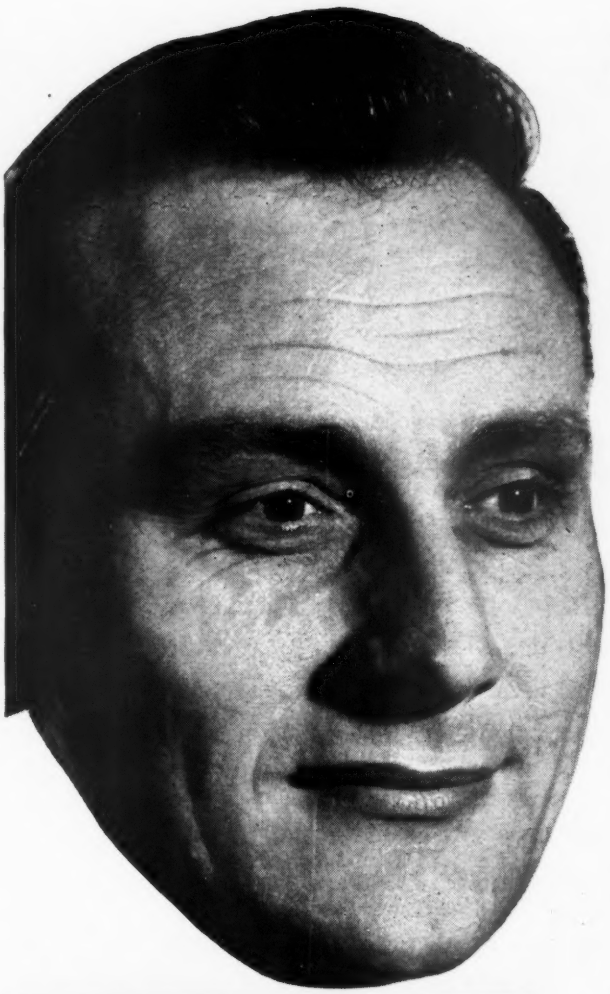
Geigy
P 33



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* *Write for Information Sheet K1 and ask to be put on our Mailing List (R) for regular information about ROCKITE.*

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"ASHLAM" Laminates are produced from paper, cotton fabric and fibreglass base materials. The fibreglass grades are bonded with Silicone, Melamine, Phenolic and Polyester type resins, and have very high dielectric and insulation properties.

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We at Universal Tools organise craftsmanship in the same way. But we work in metal, and direct our craftsmanship to modern ends — the manufacture of tools of the finest quality. Plastic moulds, press tools, jigs and fixtures — whatever the order, our aim is to design and make tools that produce the finest products in the shortest time and at the lowest cost.

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At the Power House of the North Thames Gas Board's Tar and Ammonia Products Works, Beckton, a complete, robust ventilation system was required to withstand effects of the chemical laden atmosphere. A survey by our technical staff showed that, for good working conditions, the air within the Power House should be completely changed every three minutes. The Colt SRC/3080 Controllable High Duty Roof Extractor Ventilator of anti-corrosive hardened aluminium was ideally suitable for this problem, providing a natural yet fully controllable extract system, without the running costs, maintenance and wear and tear of a mechanical system. It was estimated that twenty of these Ventilators were required. These were supplied and fitted by Colt. Results have since proved to be an unqualified success and confirmed all original calculations.

FREE MANUAL, *with full specifications of the wide range of Colt Ventilators is available on request from Dept. S.* 21/360

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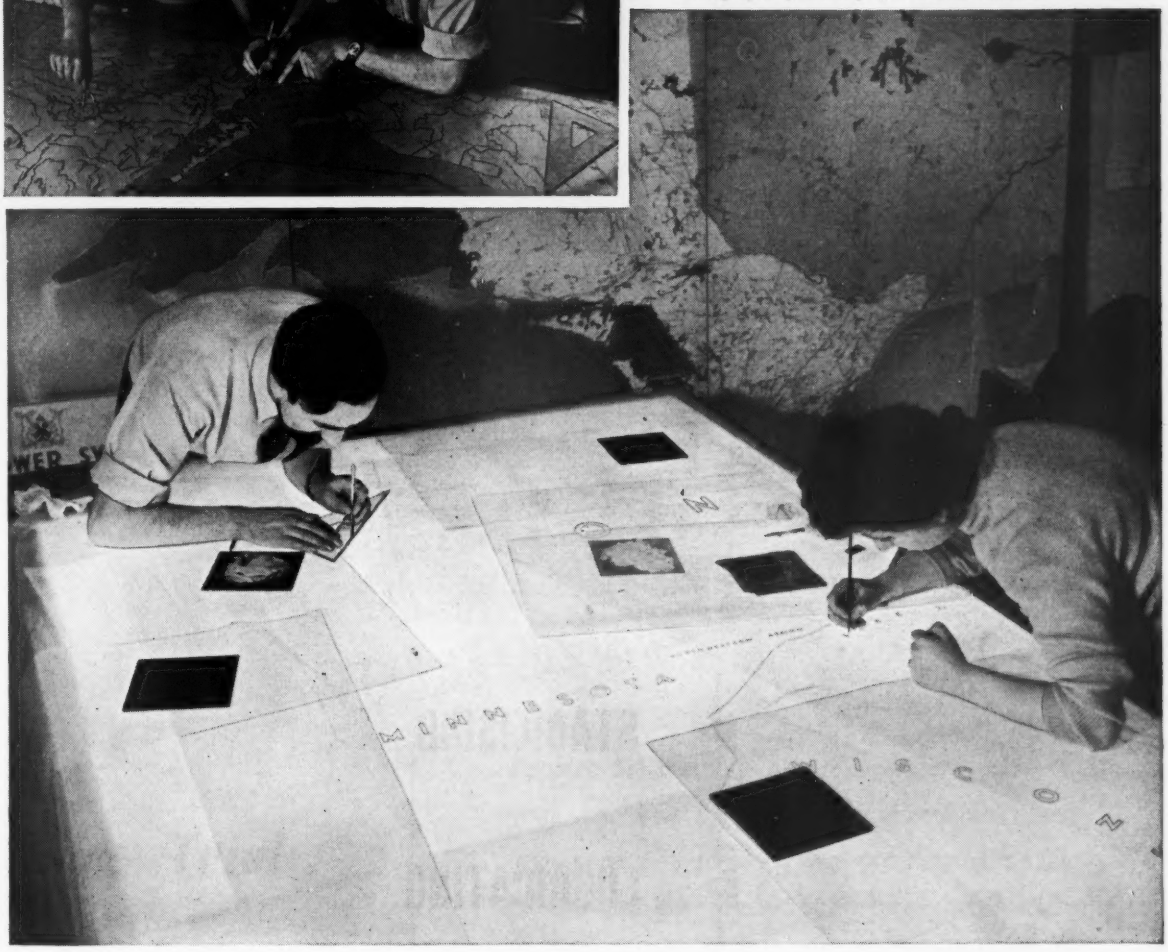
S21/361

N



Here the painted original is being transferred to impregnated paper by means of a sheet of acetate tracing film. Beneath the film can be seen those parts of the design which will be painted on to the surface of the finished laminate so as to allow for future changes without disturbing the permanent parts of the map.

Photographs by courtesy of Warerite Limited.

Adaptability of map detail through

LAMINATED PLASTICS

Extra strength and protection were among the specifications for the 11½ × 7½ ft. map of Central Canada, ordered recently by the Ontario Hydro-Electric Commission. For this map will be used to indicate both permanent and developing installations over many years.

In order to comply with these requirements, the original map supplied by the Commission, was retraced on to a laminated surface based on Melamine resins. Easy to clean and hygienic, these surfaces have a glossy, scratch-resistant finish that is far better than any previously obtained.

Not only for large wall-maps—but for many other purposes, laminated surfaces based on Melamine resins are the best available today.

BOC make only the *chemical* Melamine; names and addresses of manufacturers of Melamine resins and moulding powders will be supplied with pleasure. Please write for further information to:—

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Co. Durham. Tel: Birtley 145.

London Office:
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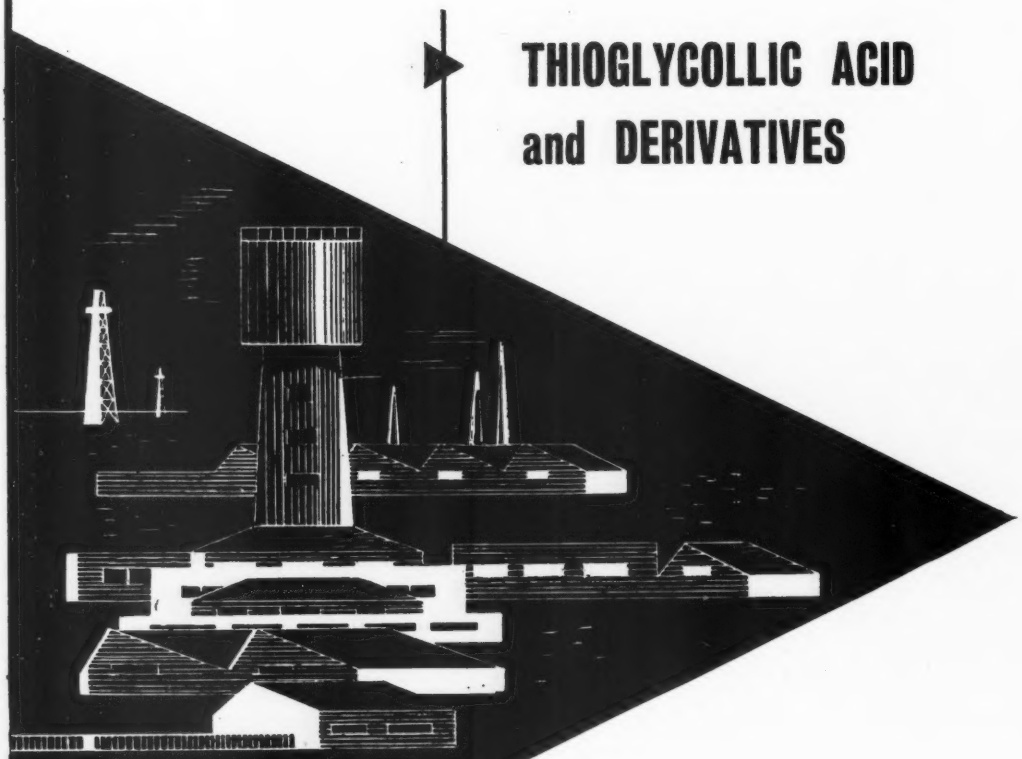
Tel: Whitehall 9777.



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without obligation

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Write for descriptive leaflet PH.126 or ask for a free trial in your own factory.

- *Thermostatic Control of temperatures between 100-280 C.*
- *Easily accommodated close to press*
- *Operates on 200/250 V 50 cps A.C. Supplies or can be arranged for use on D.C. Supplies*
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Raindrop creates a new fashion in plastic rainwear. It has an exciting satin grain and finish. This strong, flexible, dependable plastic is available for immediate delivery in .004" gauge and upwards and 48" to 54" widths.

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Vinyl plastic sheeting

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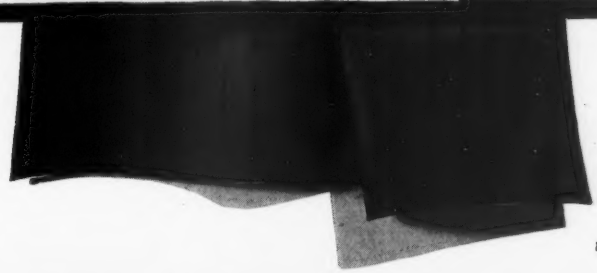

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'MOULDRITE'
comes in all these colours

I.C.I.'s urea-type moulding powders, 'Mouldrite' U.F. and W.F., can give you mouldings in every colour under the sun. These colours are stable and can be either translucent, pastel or opaque. They have no taste or odour, are resistant to tracking and are not attacked by most common organic solvents. 'Mouldrite' is the ideal moulding material for toys, tableware, bottle tops, lighting fittings and buttons.

Mouldrite is the registered trade mark for the thermosetting moulding powders manufactured by I.C.I.

IMPERIAL CHEMICAL INDUSTRIES LTD.,
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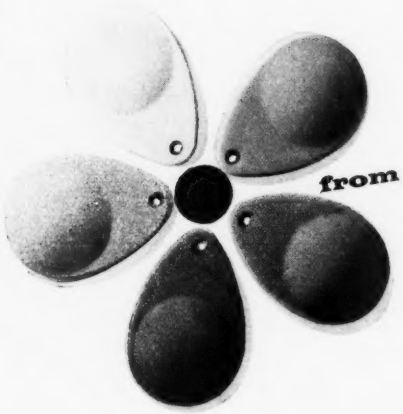
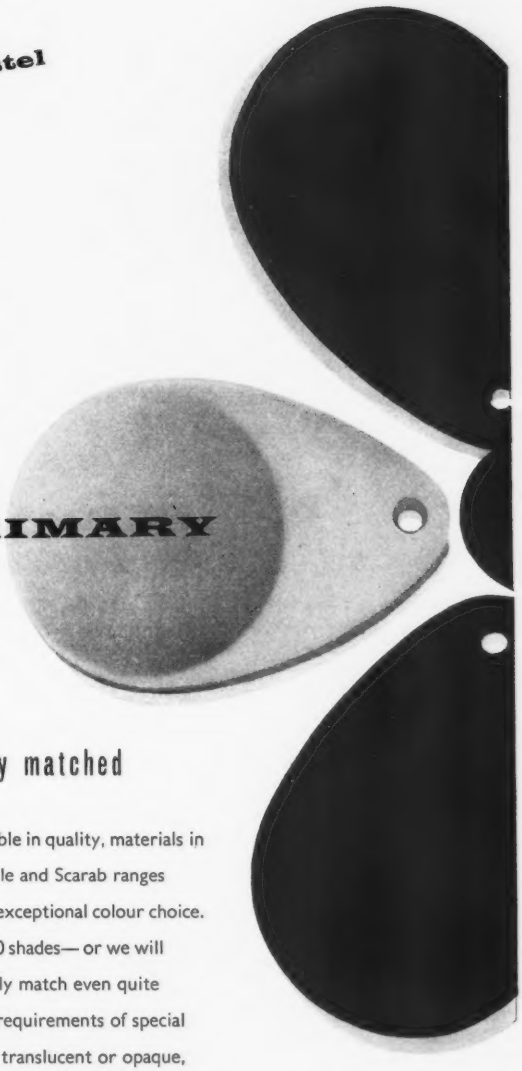


from palest pastel



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over **300** colours to choose from . . .

or your own special shades faithfully matched

Unbeatable in quality, materials in the Beetle and Scarab ranges offer an exceptional colour choice. Over 300 shades— or we will accurately match even quite modest requirements of special colours, translucent or opaque, without any increased charge. Most grades of B·I·P moulding powders pellet satisfactorily and are made in easy, easy/medium, medium and stiff flow types.

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NESTORITE	GRADE A.1025
ACID RESISTANT	
Filler	Woodflour
Particle size (inches)	1/10
Specific gravity	1·35
Bulk factor	2·2—3·7
Powder density	0·50—0·60
Time of cure of Test Cup (secs.)	60
Recommended flow range	5—8
Shrinkage (thou./inch)	7.5—9.5
Flowability (cm.)	8—9
Brinell Hardness	35—40
Impact strength (ft./lb.)	0·15—0·19
Crossbreaking strength (lb./sq. in.) ...	10,000—11,000
Tensile strength (lb./sq. in.)	6,000—8,000
Water absorption (7 days) (mg.)	150-300
Dimensional stability in water (thou. per in of mldg.)	12
Dimensional stability after heating (thou. per in. of mldg.)	4
Plastic yield grading (°C.)	140
Blister temperature (50°C. per hr. rise)...	180
Electric strength at 90°C. minute value (V/mil.)	20—40
Surface resistivity after immersion (log₁₀ohms)	9—11
Volume resistivity (as moulded) (log₁₀ohm cm.)	10—11

This material is suitable for use in contact with battery acid. It cures rapidly, but is soft on extraction from the tool. Increase in weight after 28 days' immersion in battery acid at 60°C.—0·45% compared with G-type material—10%. Growth after 28 days immersion in battery acid at 60°C.—Nil, compared with G-type, 10%.

The Goldfish and the Acid Test

Phineas Gloop the goldfish lived beneath the outfall from a chemical works. But one day he found that his scales were losing their lustre, and soon afterwards that he was swimming upside down in rapidly diminishing circles . . . for that outfall was strongly acid.

He was in this unfortunate position when a pike swam up to him and said: "*Excuse me, old boy, but do you know you're the wrong way up? Cummalonga me and I'll soon have you right!*"—and he swam away with Phineas following in his wake . . . still upside down.

After a while, they came to a place where the river bank shelved. The pike stopped and said: "*See them ants, they're eating NESTORITE Grade A.*1025 *from that used drum. Grab as many of their eggs as you can, and whether you eat 'em raw or cooked, they'll make you so Acid Resistant that you'll be able to live in a carboy of Industrial Sulphuric . . . and right way up too!*"—and off he swam to see a reed-bed about a roach.

Yes, Ferguson's NESTORITE Grade A.1025 is so Acid Resistant that it turns red Litmus sick!

YOU'RE RIGHT WITH 'NESTORITE'

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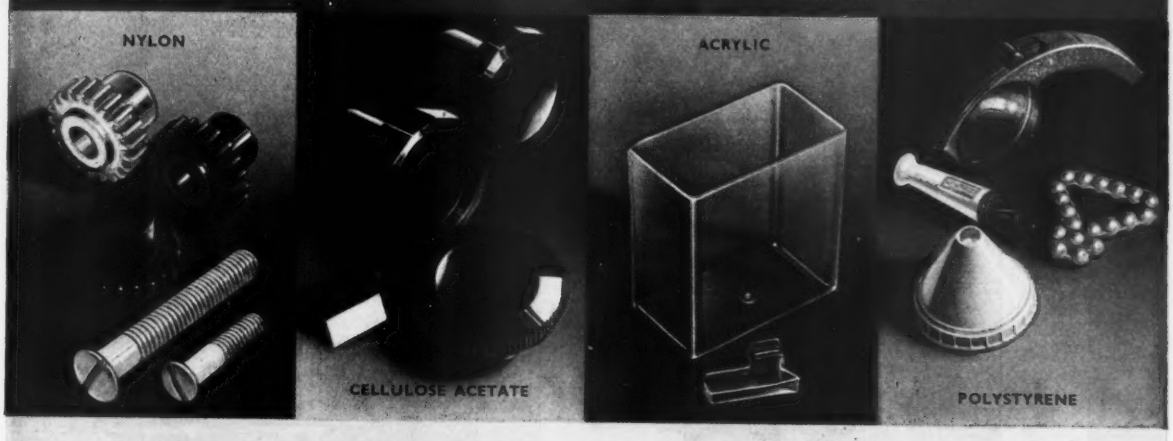
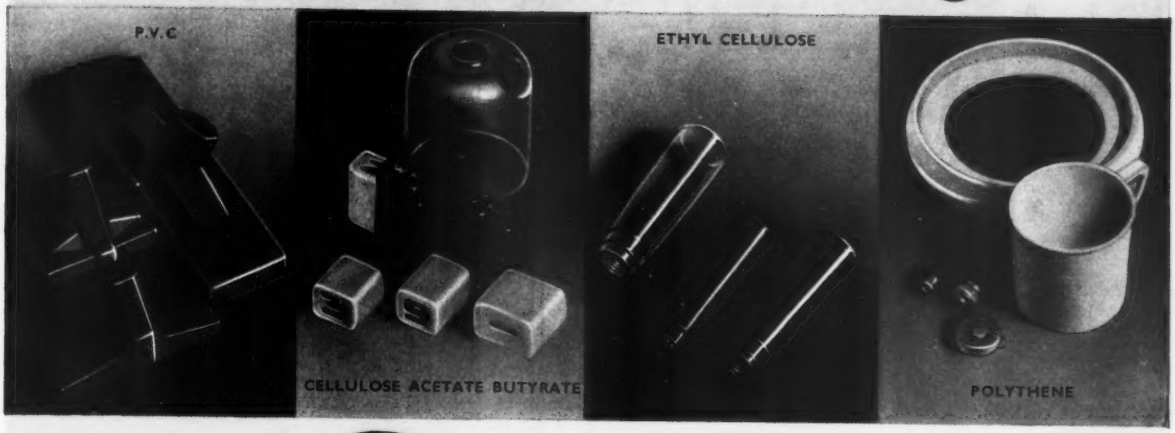
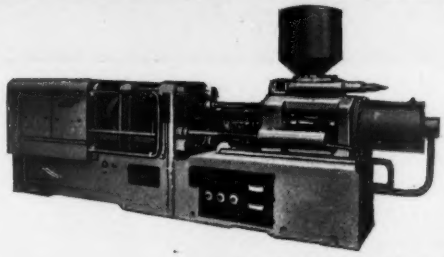
Insulators Ltd



injection mouldings





INJECTION MOULDING MACHINE

Insulators Limited are fully equipped to supply INJECTION MOULDINGS in quantity in the widest variety of materials and designs using modern plant and equipment with machine capacity ranging from 1–32 ozs. Illustrated above are a few examples of the extensive range of Thermoplastic materials in which Insulators Limited produce components. Their experience extends over 25 years and embraces every branch of plastic moulding technique. All the unique skill and comprehensive technical knowledge of Insulators Limited are at your disposal.
Inquiries are invited and will receive prompt attention.

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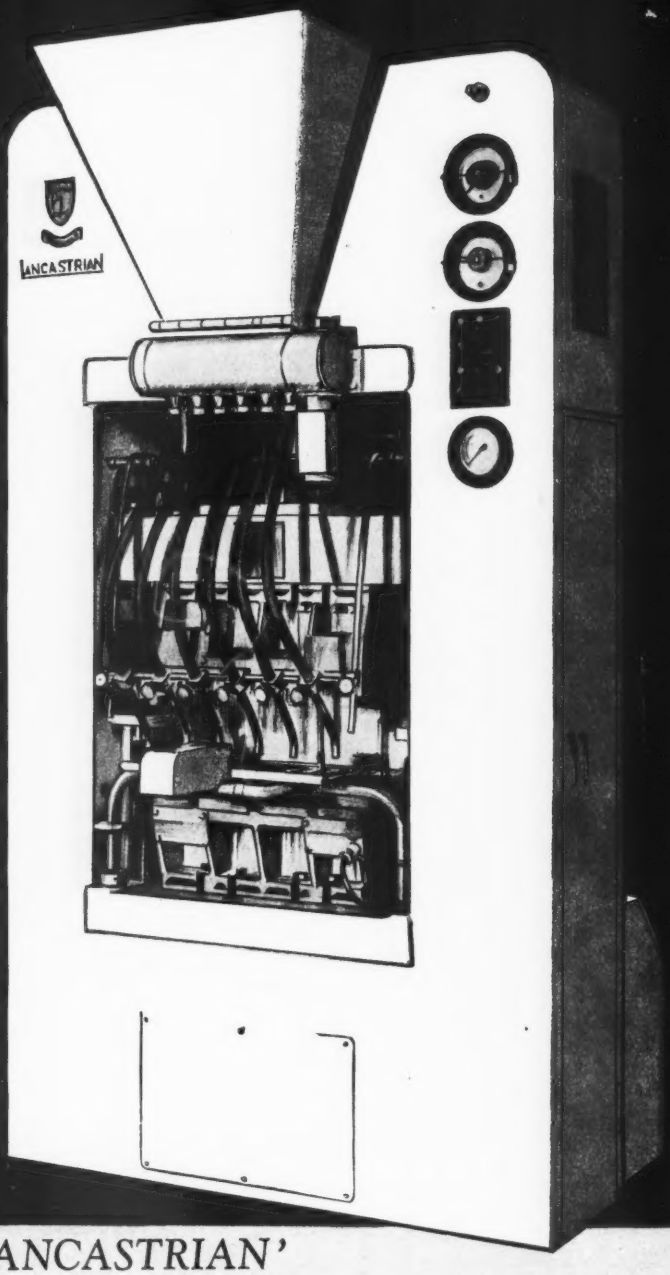


'LANCASTRIAN' MOULDING PRESS

The 50-ton Automatic Press, shown above, offers the most economical moulding production possible; it will produce continuously and without any attention so long as it is supplied with powder. Measuring, feeding, breathing, ejecting, checking and mould cleaning are fully and continuously automatic. Included in our range are semi-automatic, compression and transfer moulding presses in 100, 150, 250, 400, 600, and 1,200-ton models: core pulling rams and other accessories are available.

A standard range of presses is available for:—
PELLETING, CERAMICS, GRINDING WHEELS,
FORGING AND DEEP DRAWING,
PLYWOOD AND SYNTHETIC BOARDS

Our engineers are always pleased to discuss the design of special purpose presses to your requirements. Ancillary equipment can be supplied including our Rotocube mixers and Lancashire, Cornish and Economic Boilers.

Please mention "Plastics" when requesting further information from

Foster Yates & Thom Ltd.

BLACKBURN, ENGLAND. Telephone: Blackburn 4224
London Office: Terminal House, Grosvenor Gardens, S.W.1. Telephone: SLOane 2255

FOUNDED 1826

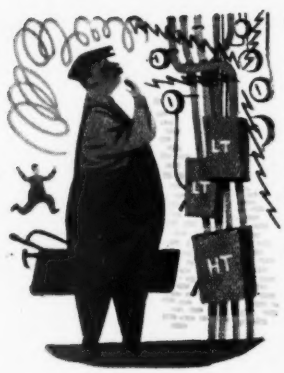
Between this girl's bath
and the wall
There used to be nothing
at all
Till a lively young lad
Thought: I've got it,
begad!
PVC would undoubtedly
make an effective,
economical, attractive and
easy-to-fit sealing-strip.

A motor designer from
Lancs
Gratefully murmured his
thanks
When a Lorival chap
After doffing his cap
Suggested that PVC
would make an effective,
economical and easy-to-fit
petrol tubing.

Some limericks – from the

A fireman, talking aloud
Made this remark to the
crowd
Some boffin, I hear
Has a darned good idea
He says that PVC
would make a remarkably
effective, tough, durable
fire hose lining.

There once was a
Scotsman of Fife
Whose packaging
problems were rife
Until one day he spoke
To a Lorival bloke
Who said that PVC
sheeting would be an
effective, economical,
moisture-and-chemical-
proof answer to his
packaging problems.

lively lads at Lorival . . .

An electrical fellow
near Speke
Discovered a terrible
leak
But along came his
mate
At a helluva rate
Saying that Lorival
PVC would make an
effective, economical
insulating material for
all sorts of electrical
work.

PVC, in the hands of Lorival's lively lads, can do a lot of jobs better and cheaper. Why not drop a line to Lorival? Then you can get together with the lively lads and figure out ways and means of using PVC to your advantage.

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United Ebonite & Lorival Ltd., Little Lever, Nr. Bolton, Lancs.

L63

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OVER-HEAT SWITCHES
RATE-OF-RISE CONTROLLERS
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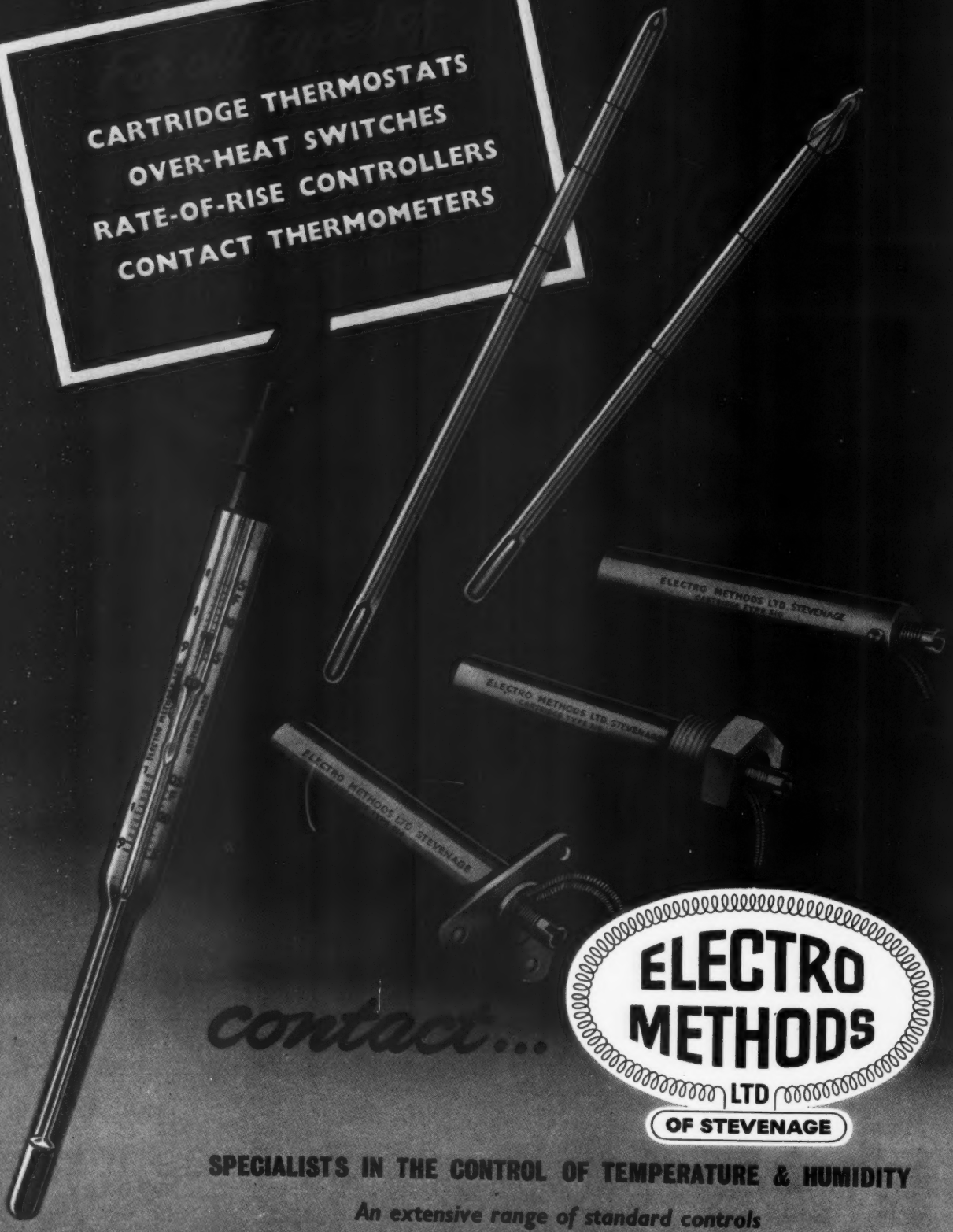

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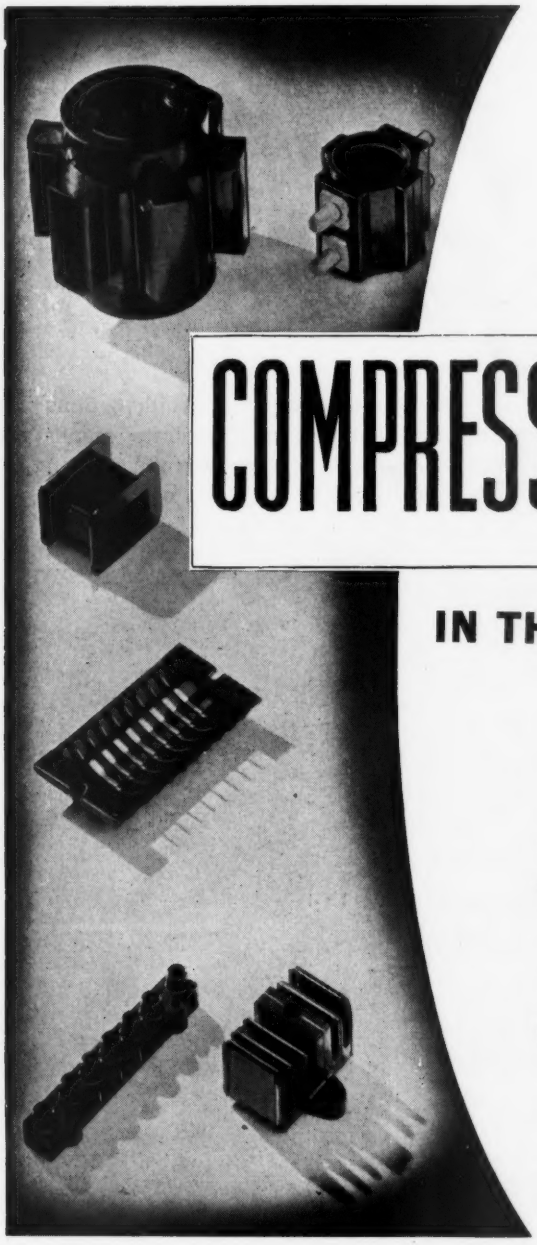

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A highly qualified technical staff is at your service.

Thermo-Plastics Ltd.

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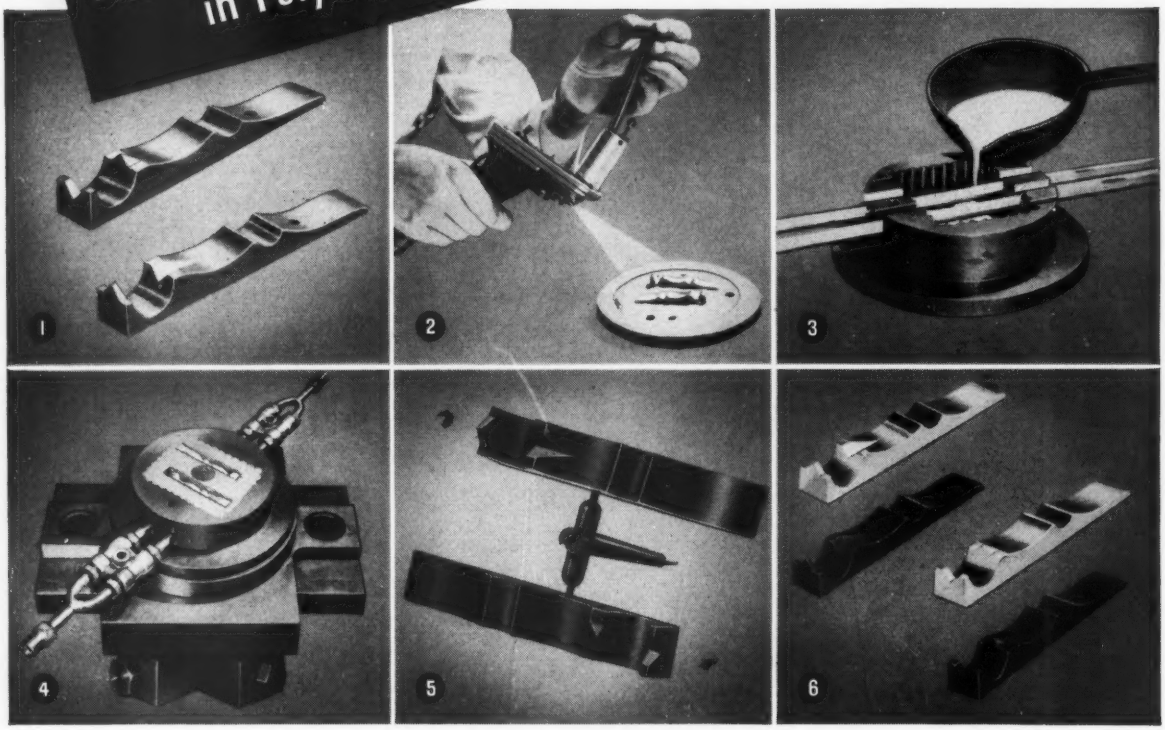
D

33 HOURS from PATTERN to PRODUCT in Polystyrene

For the First Time!

By courtesy of Messrs. S. Smith & Sons (England) Limited, we illustrate manufacture of injection mould for production in Polystyrene in a total time of 33 hours and a fraction of cost of machining.



1. Aluminium master pattern.
2. Spraying pattern with Cerrocast.
3. Pouring molten Cerrocast to back sprayed shell and embed water cooling tubes.
4. Complete mould. 5. Typical shot.
6. Comparison of patterns and mouldings.

★ *Technical advice on the selection and application of correct alloy to suit your problem available on request.*

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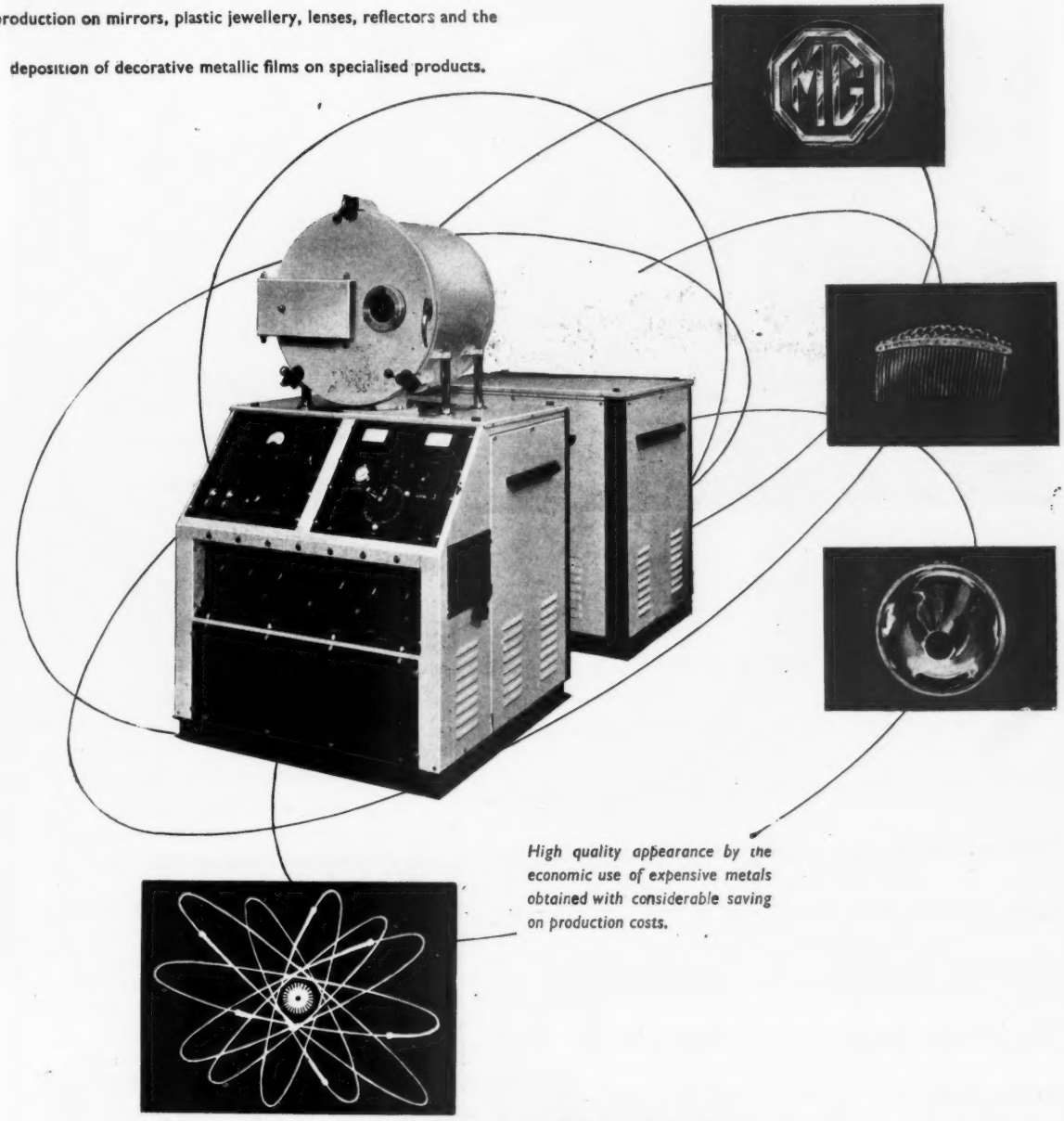

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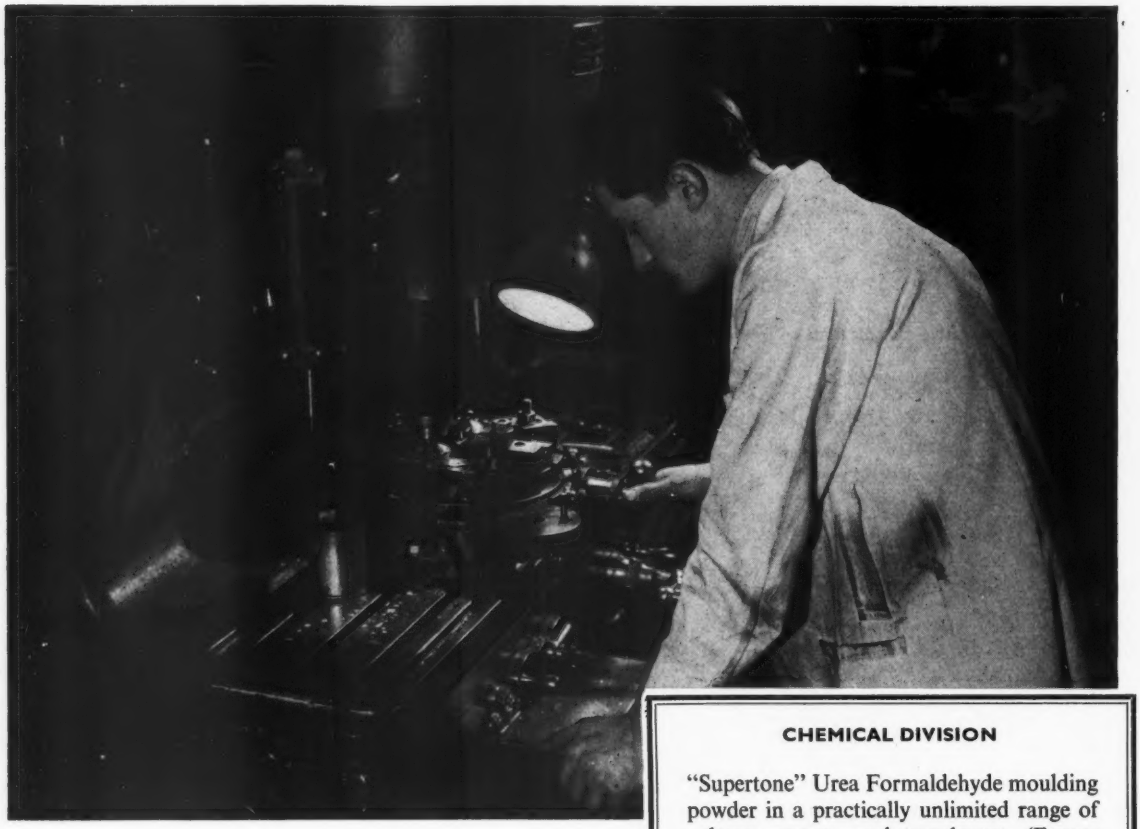

In the Engineering Division of Lacrinoid.

Since the War important developments have been taking place in the Lacrinoid organisation. Great extensions in service to industry have been made and the output of products for ultimate sales to the public has grown considerably in volume.

The current programme is shown in the panel on the right.

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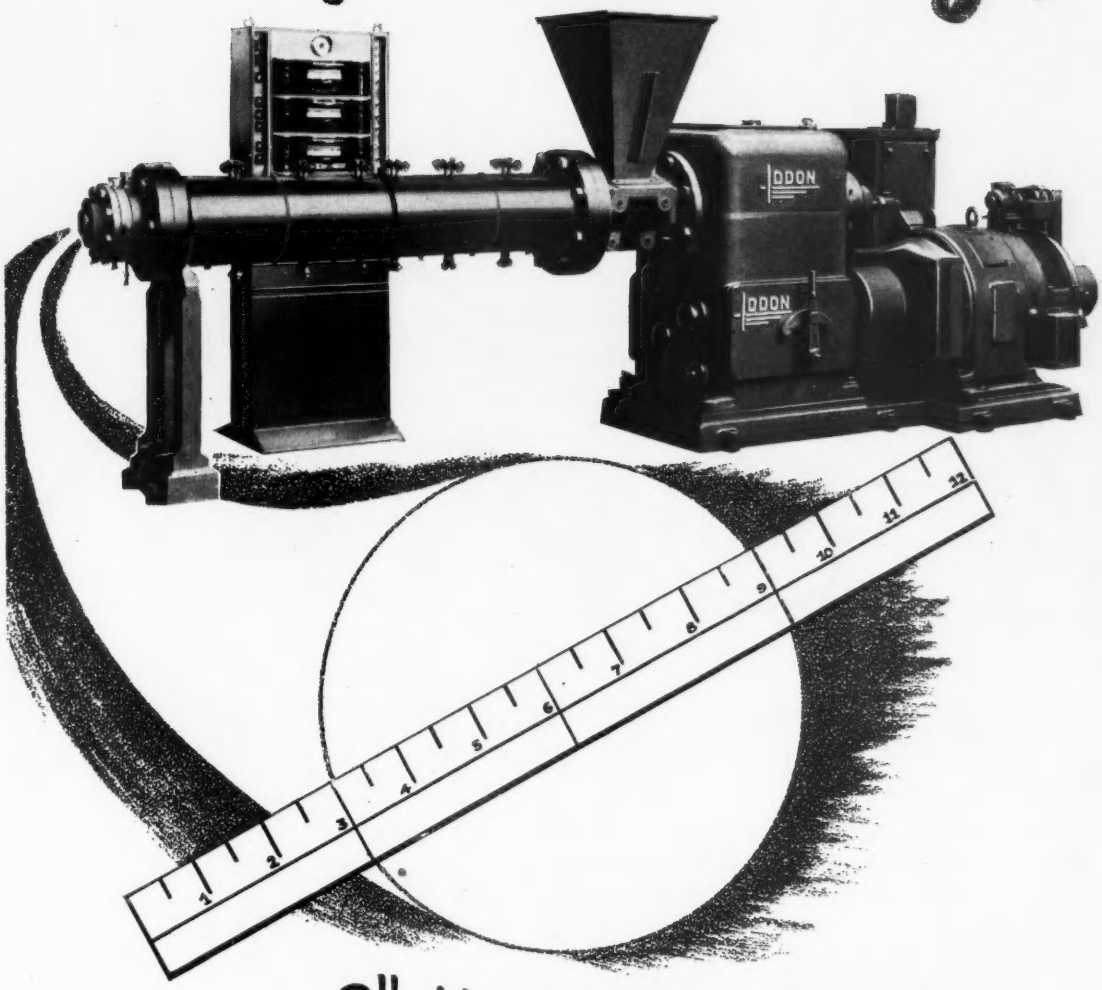
LACRINOID AND COLORTONE MEN'S BUTTONS
SUPERTONE BUTTON BLANKS
VIETUM SHRINK SLEEVING AND COVERS
LACRINOID PLASTICS BOTTLES

FINISHING PROCESSES DIVISION

This Division specializes in the manufacture of plant and of media for modern barrel-finishing processes for the plastics and metal industries. It has its own physical laboratory, where samples can be processed, and is supported by a Technical Advisory Service.

Adaptability!



6" diameter screw

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B.O.C. P.V.A. is made from British raw materials. It is checked by B.O.C.—at every stage of manufacture and you can take its uniformity and stability for granted.

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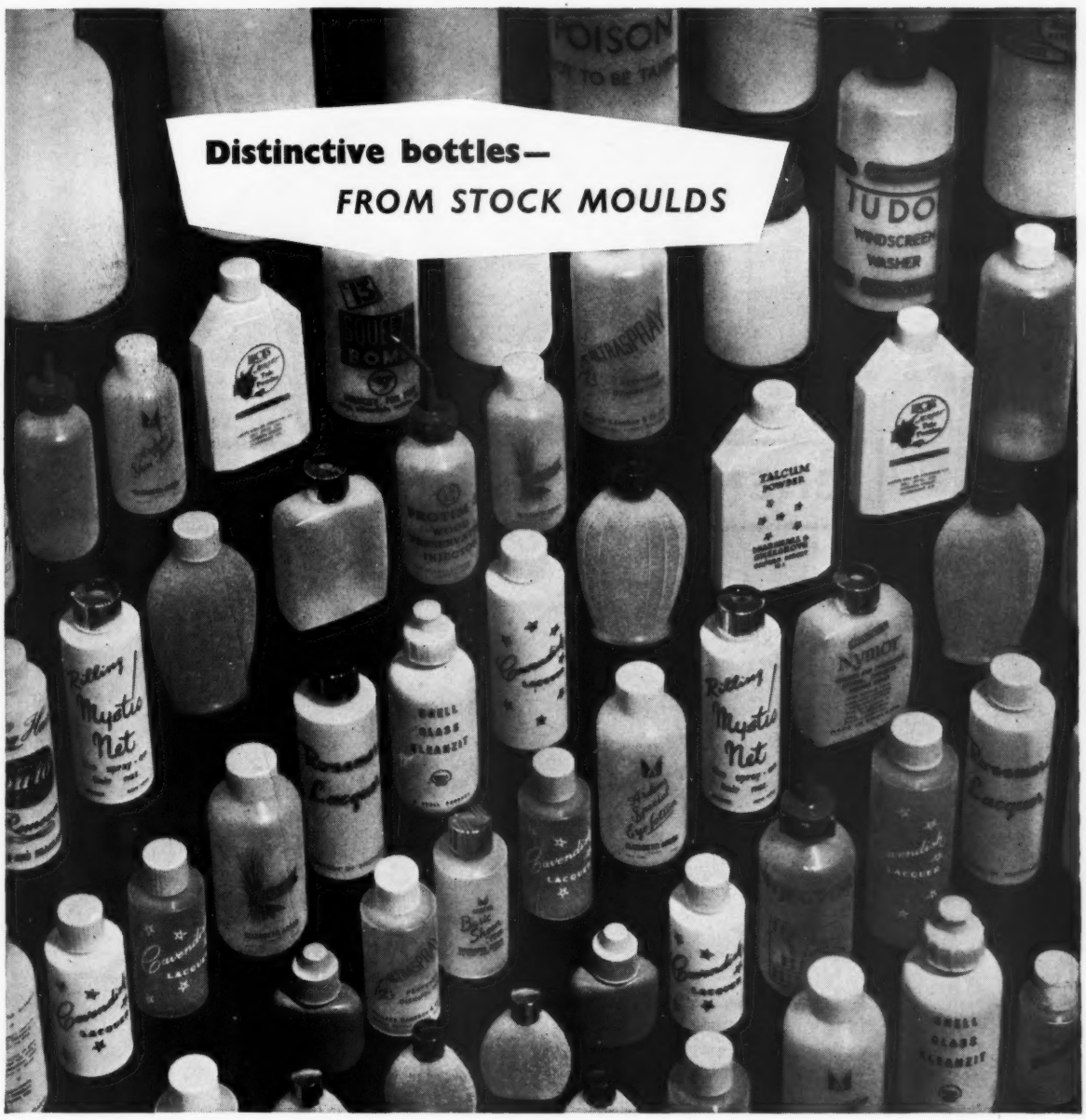
London Office: Bridgewater House, St. James's, S.W.1 Tel: Whitehall 9777.



These bottles have all been produced from stock moulds, and individuality is obtained by ringing the changes with colours and contrasting colour printing to give your product that tailor-made packaging look. If your product needs to be sprayed, puffed, poured through a small aperture, dispensed drop by drop or just packaged attractively, then Poly-Tainer have the answer to your problems. We make these unbreakable polythene containers in all shapes and sizes from 4 cc. to 15-gallons, and the choice of colour is yours. Distinctive coloured Poly-Tainers from stock moulds means that your product can have an individually styled package **without any tool costs.** *Of course, we undertake custom styling on request.*

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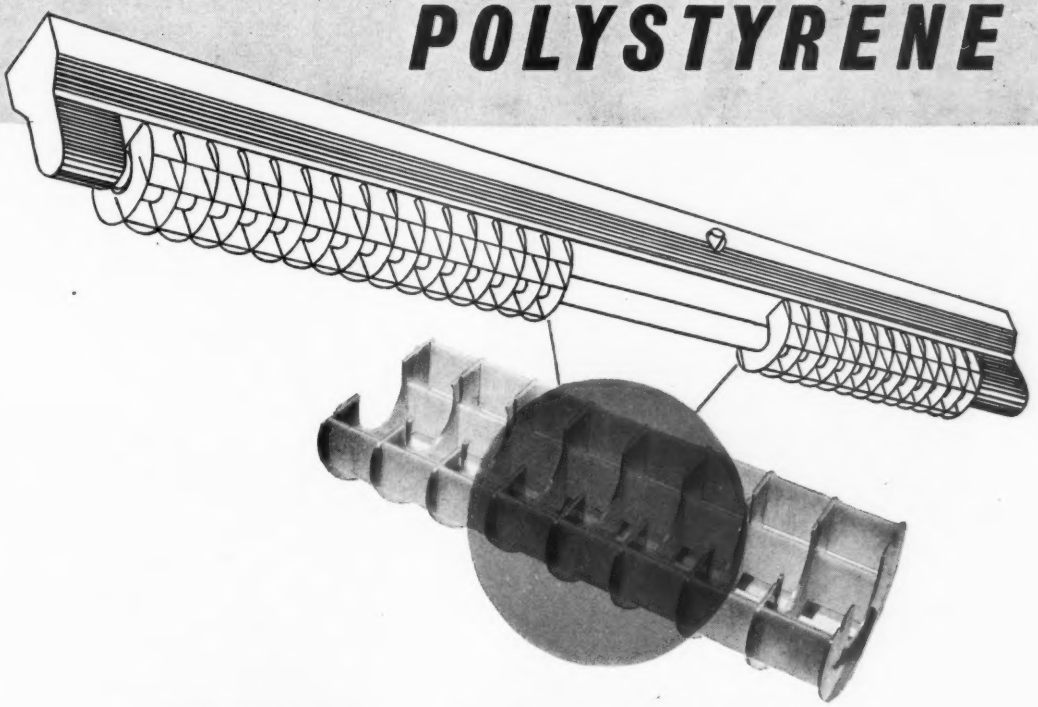
HIGH LIGHTING EFFICIENCY *through*

Erinoid

POLYSTYRENE



CLIPLUVE, the new patent clip-on lighting louvre*, is produced by Tube Laminations and Engineering Ltd. in Erinoid light-diffusing pearl polystyrene. This material diffuses light and at the same time achieves a maximum lighting efficiency. In the case of the CLIPLUVE fitting, used by the Ministry of Works, a general lighting efficiency of 90% is obtained. Vertically below the fitting, the efficiency is 100%.

Erinoid light-diffusing pearl polystyrene is available in KLP (general purpose), 2CL (high molecular weight), HS (heat resistant) and 2CL/HS grades. All grades of Erinoid polystyrene are available as moulding powder, sheets and extruded sections.

**Prov. Patent No. 7685/54. Registered Design No. 870221*

Erinoid Polystyrene is manufactured by

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Full information, samples, prices, etc. on application to

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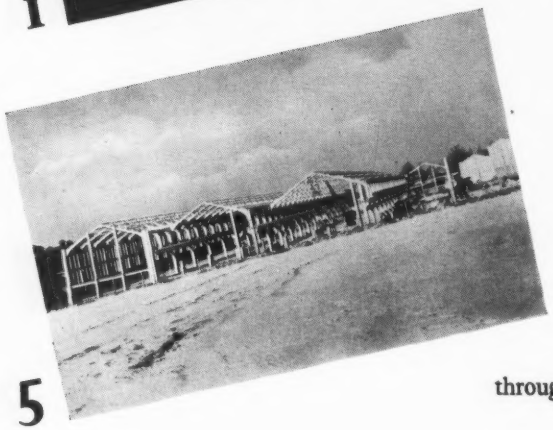
Telephone: Stroud 810

LONDON OFFICE: 96 PICCADILLY · LONDON · W1 · TELEPHONE: GROSVENOR 7111

12 months ago a GUARANTEE was given by Beecham Buildings Ltd., to complete a new factory of 200,000 sq. ft. for Sterling Metals Ltd., of Nuneaton within a year. This factory is now ready for production.

1

2



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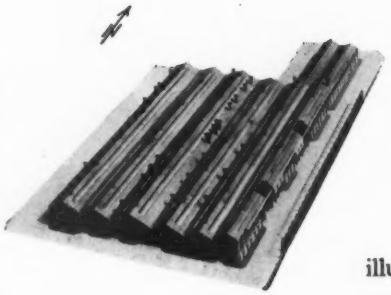
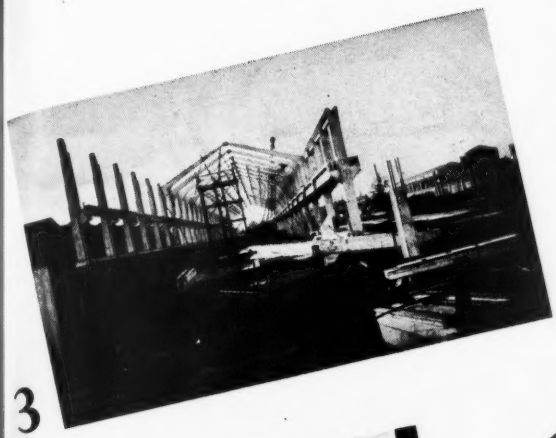


Completed on time, this contract was carried through a winter which is memorable for its severity. One of the worst continuous twelve months of weather since Meteorological records have been kept failed to interrupt the daily production of concrete components at the Beecham Works and their erection on the site. This new factory is standing proof of the value of Beecham's guarantee, proof that Beecham's new ways of building produce the speed, economy and results that are necessary in modern industry. This is the largest permanent prefabricated concrete building in Great Britain. The model illustrated on the left was used to pinpoint progress on this contract.



3

4

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7

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Beecham Buildings

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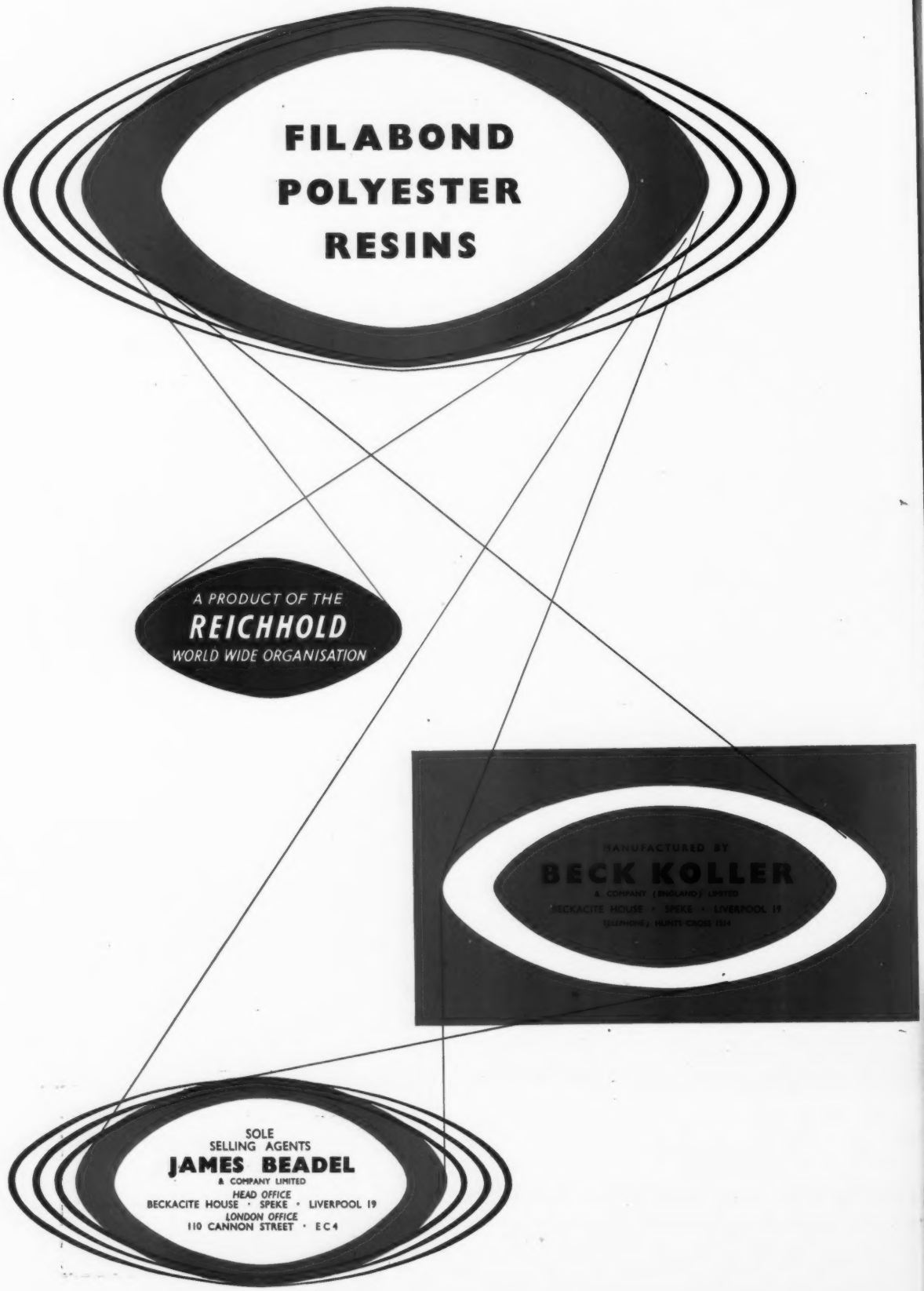
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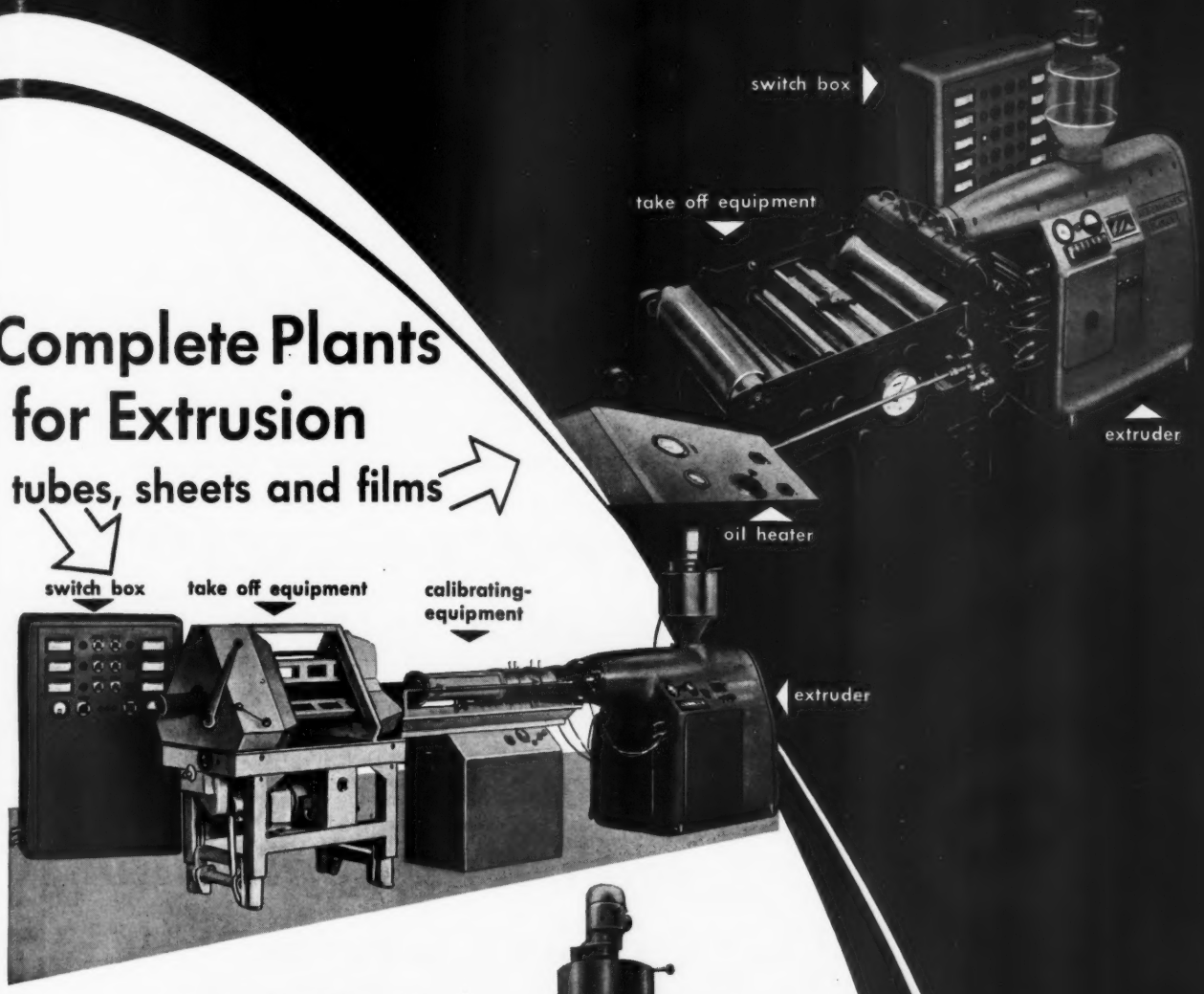

Extruder S 90 RGV
90 mm screw-diameter = 3.54 "

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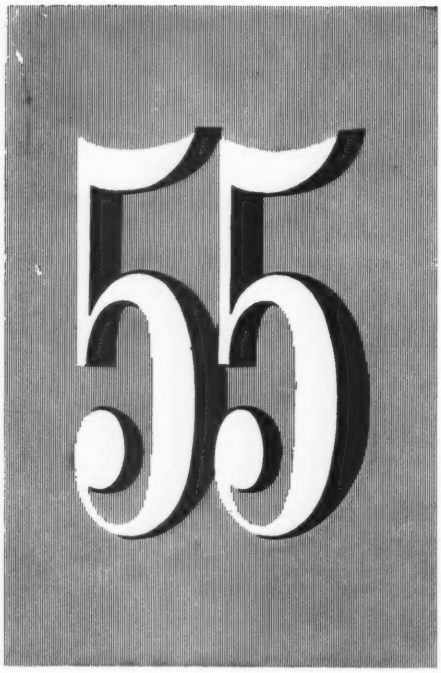

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VINATEX P.V.C. Colour Concentrates are available in an extensive range of standard colours, and alternative shades can be produced by blending the concentrates as required.

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Compounds are supplied in the form of chips or uniform pellets for all applications including Extrusion, Injection Moulding, Gramophone Records and Calendered Sheeting.

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V.39

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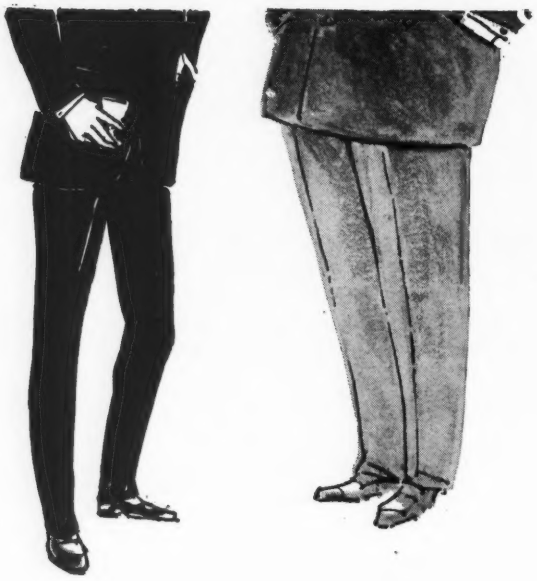

At Barry, Glamorgan, a large modern factory has been designed and is being built especially for the production of STYRON 475 and 666. This announcement is of the greatest importance to manufacturers and moulders throughout the United Kingdom and abroad — British-made STYRON* will be freely available to all! British Resin Products Limited— as the sole selling agents for STYRON POLYSTYRENE — welcome and will deal promptly with all enquiries about STYRON from British production.

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TRADE MARK

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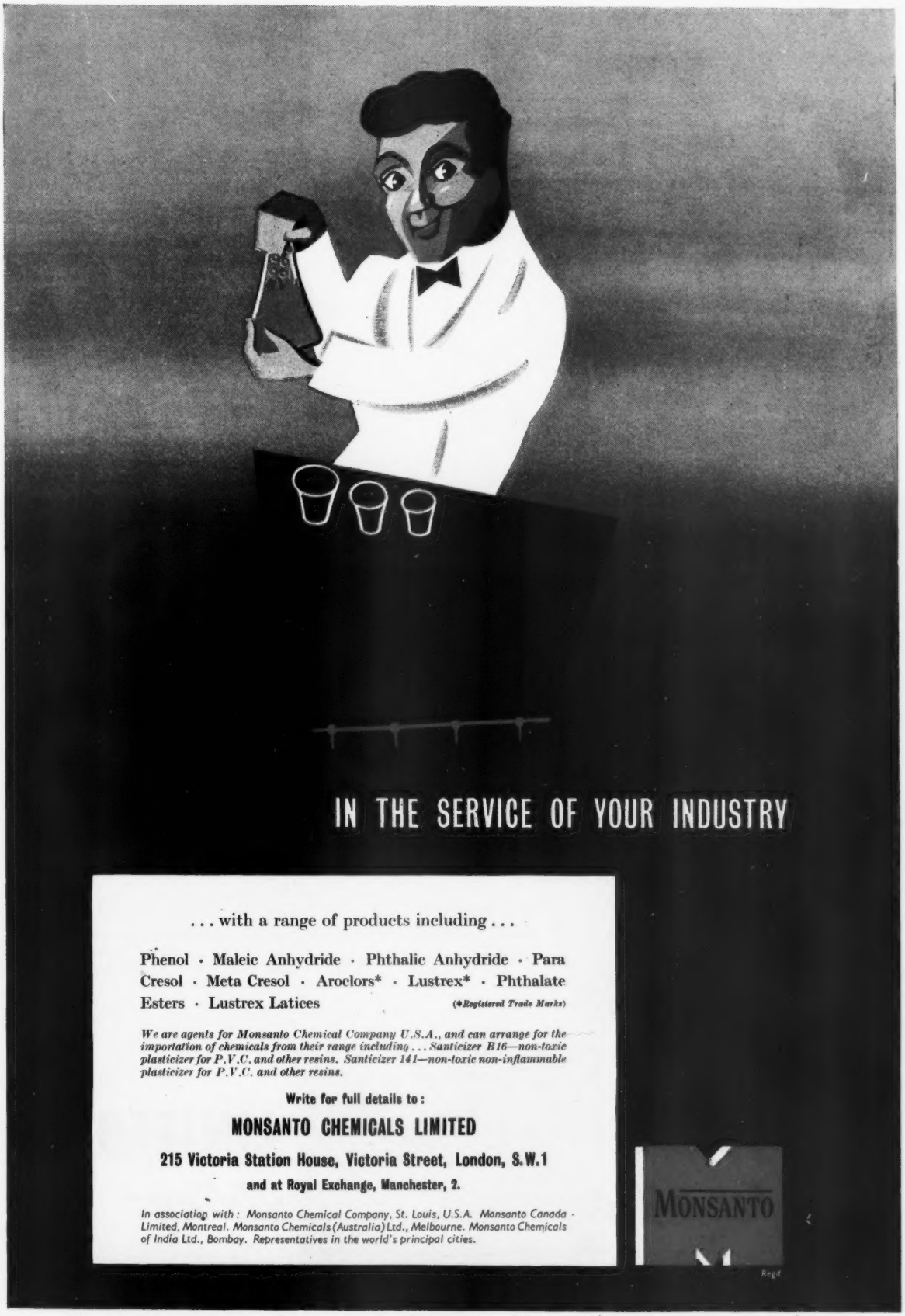
- It does not chip or scrap when machined and is ideal for precision work.
- Available in many thicknesses — coloured, clear, transparent or opaque, it is widely used for optical purposes.
- 'Celastoid' combines toughness and clarity so necessary for vizors, goggles, windshields and machine guards.
- 'Celastoid' has a high-quality finish that adds sales appeal to many products—from toys to lampshades.

Lamp by Aladdin Industries Limited. Dolls by Britannia Toy Company Limited. Miniature Hand with Vizor by Siebe, Gorman & Company Limited.

BRITISH CELANESE LIMITED

PLASTICS DIVISION,

CELANESE HOUSE, HANOVER SQUARE, LONDON, W.1.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In association with: Monsanto Chemical Company, St. Louis, U.S.A. Monsanto Canada Limited, Montreal. Monsanto Chemicals (Australia) Ltd., Melbourne. Monsanto Chemicals of India Ltd., Bombay. Representatives in the world's principal cities.
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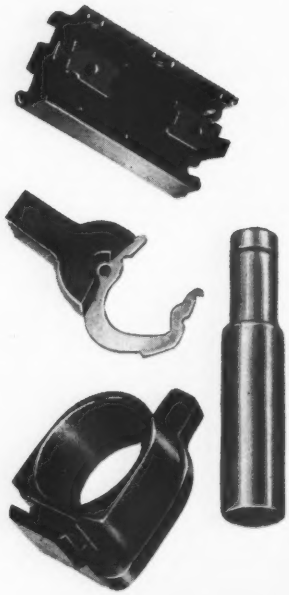
ROOTES

VARIETY IS THE SPICE OF LIFE



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ROOTES MOULDINGS LIMITED

For all compression mouldings

Contractors to M.O.S., Admiralty, etc. A.I.D. Approved

SLOUGH · BUCKS · TEL: SLOUGH 22349

[redacted]

knock at any door...?

The Pressed Steel Company Limited were looking fo
an attractive, functional easy-to-clean evaporator do
for their new Prestcold refrigerator.
It was our kind of job..... technicians and workmen
rolled up their sleeves—and here you see
the result, this high impact Polystyrene door.
Simple, streamlined, effective—altogether a pretty
good job. Leastways thats how our clients,
The Pressed Steel Company Limited feel about it—
and we at Rootes Plastics like to think so too.
No matter how big or small, if your problem is plastics bring it to the Rootes door—you won't even have to knock.

TURE INJECTION MOULDINGS IN
OF THERMOPLASTIC MATERIALS
:

OLYSTYRENE NYLON

POLYTHENE DIAKON

POLY-VINYL-CHLORIDE

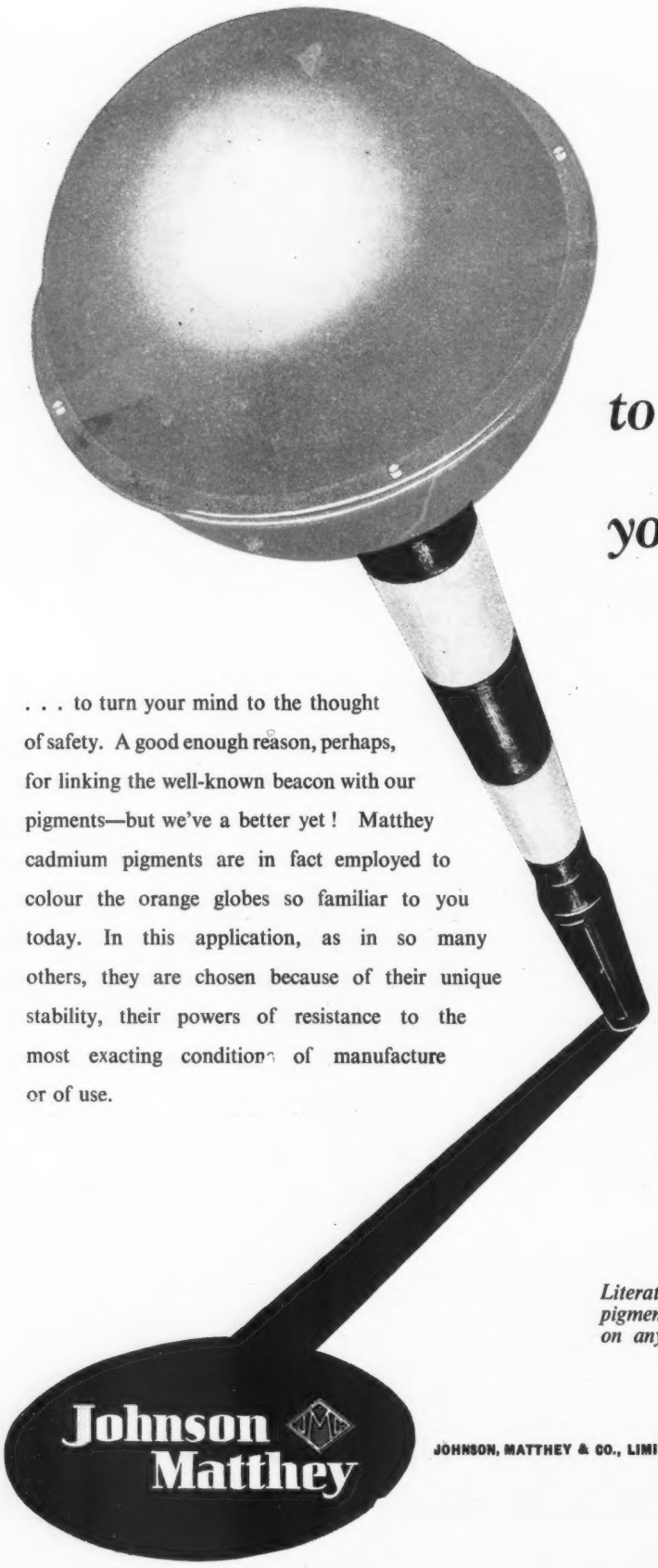
[redacted]

ROOTES [redacted] LIMITED

For all [redacted] uldings

Contractors to M.O.S., Admiralty, etc. A.I.D. Approved

SLOUGH · BUCKS · TEL: SLOUGH 22349
Smee's R110



to catch

your eye . . .

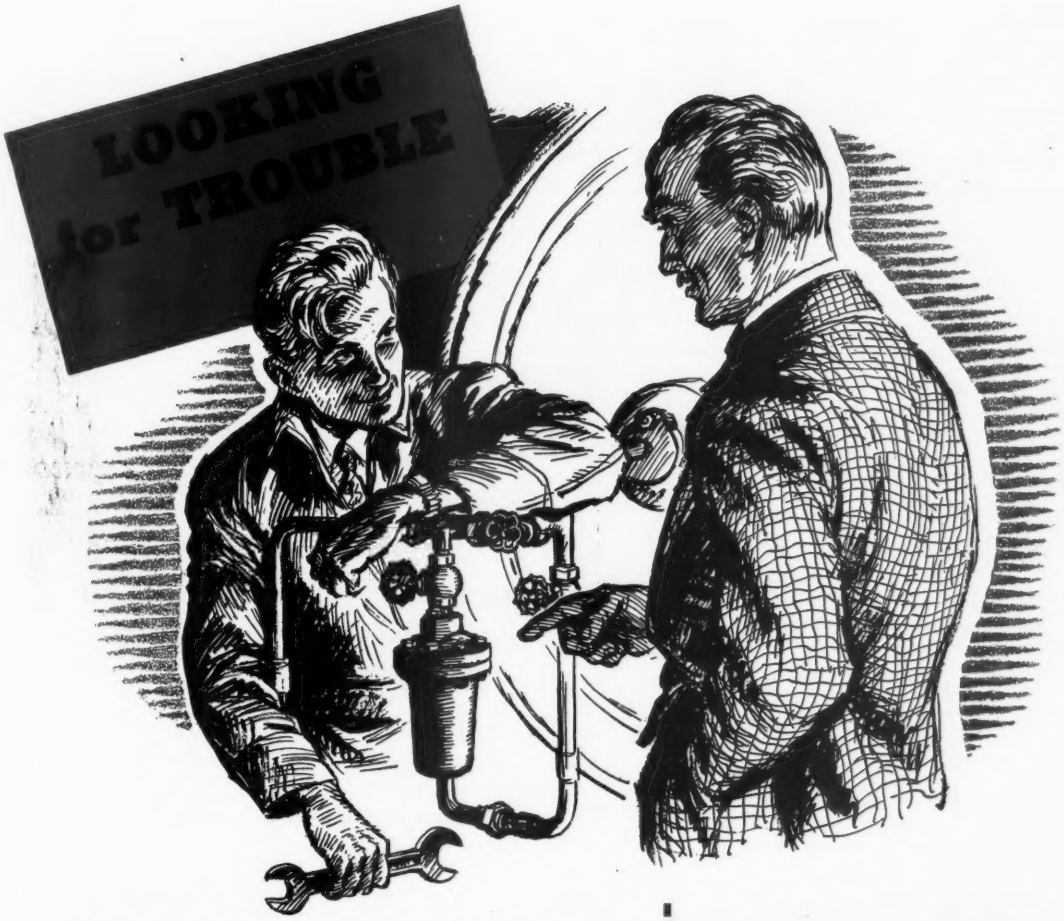
. . . to turn your mind to the thought of safety. A good enough reason, perhaps, for linking the well-known beacon with our pigments—but we've a better yet! Matthey cadmium pigments are in fact employed to colour the orange globes so familiar to you today. In this application, as in so many others, they are chosen because of their unique stability, their powers of resistance to the most exacting conditions of manufacture or of use.

Matthey
CADMIUM PIGMENTS

Literature describing Matthey Cadmium pigments is available on request and enquiries on any colouring problem are welcomed.

Johnson Matthey

JOHNSON, MATTHEY & CO., LIMITED, HATTON GARDEN, LONDON, E.C.1. Phone: HOLborn 6989



"My pal who works at the mills says they have no trouble with their Hijaluka traps. . . . I thought you said Hijaluka traps had no life, Chief."

"*That's so, Son.*"

"Well, how come the mills don't have any trouble?"

"*Trouble isn't there only when you know it. A trap can eat up steam* ***before*** *the condensate return system breaks down. Waterlogging can* ***lose*** *a whale of production if you don't realise proper drainage gives you* ***more*** *production. An engineer doesn't* ***have*** *to keep track of his spares costs unless the buyer kicks. A Chief Engineer doesn't* ***have*** *to know just how much time his fitters put in fiddling the traps.*"

"*To know if you've got trap trouble you have to go and look for it. But it pays. Our Drayton Armstrongs cost us round about 9d. a year for maintenance all in, and a lot of our traps are 15 years old.*"

TYPICAL NO-TROUBLE CASE

(at a Midlands Hospital)

DAILY CALL SHEET 7/1/55. . . . Had interview with Mr. P. He considers that the traps he has installed are working very well. I did note on leaving his office that the trap fitted to the office radiator was blowing live steam.

TYPICAL DRAYTON INSTALLATION

(a firm of dyers in E. Anglia)

"While sending you an order for more of your Bucket Traps, we feel impelled to tell you what excellent service we have always had from these marvellous little Traps. It is literally true that one can fit one of these Traps and then forget all about it. The saving in cost of spare parts so frequently fitted to other makes of Trap must be considerable."

(Director)

DRAYTON

STEAM TRAPS

DA 43

THE DRAYTON REGULATOR & INSTRUMENT CO. LTD., WEST DRAYTON, MIDDLESEX. *(West Drayton 2611)*

PCL
PURE CHEMICALS LIMITED
PLASTICS DIVISION

FERROCLERE
VINYL STABILIZERS
Production commences this month

If you use Vinyl Stabilizers . . .

you know that a mixture of barium and cadmium soaps is more efficient than either used separately.
But—
did you know that a co-precipitated barium-cadmium stabilizer is more efficient than a mixture?

. . . you can prove it with

FERROCLERE 1820

now available

If you have had difficulty...

with the incorporation of Epoxy Resin Stabilizers in P.V.C,
or—
if you want to increase stability without increasing lubrication

...try FERROCLERE 900

now available

Have you had your copy of the Ferroclere vinyl stabilizer handbook?

PURE CHEMICALS LTD · PLASTICS DIVISION · KIRKBY INDUSTRIAL ESTATE
NEAR LIVERPOOL · OUR NEW TELEPHONE NUMBER IS SIMONSWOOD 2875

We didn't know our head from our heels

until we called in KING (and got things moving)

Inefficient handling can upset the production applecart considerably. Conversely, modern mechanical handling methods can work little miracles in making things run smoothly. More and more production men are recognising the great value of modern mechanical handling methods.

Call in KING and get things moving. *Our representative will call on you anywhere in the world.*

STREAMLINE ***your production with***

KING

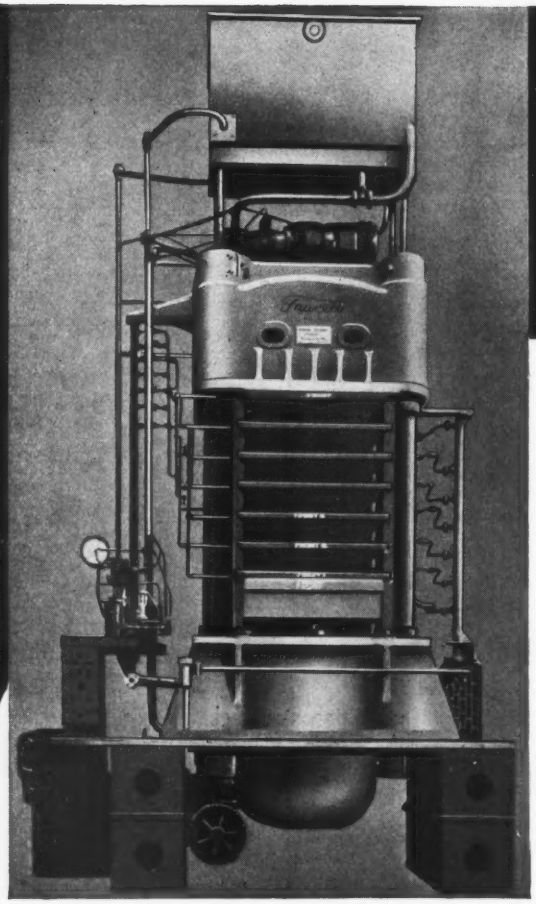
REGISTERED TRADE MARK

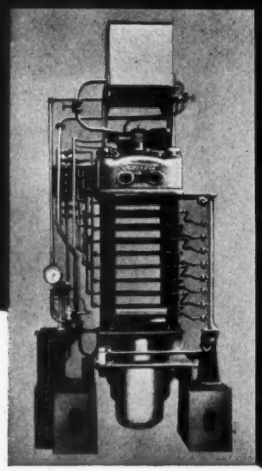
CONVEYORS • CRANES • PULLEY BLOCKS

Covered by British and Foreign Patents

GEO. W. KING LIMITED, 67 ARGYLE WORKS, STEVENAGE, HERTS. TELEPHONE: STEVENAGE 440

H



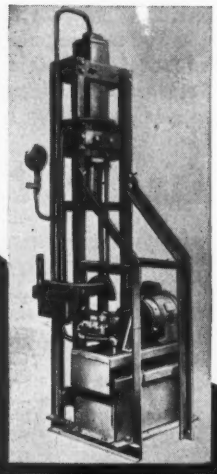


A 500-ton upstroking multi-platen press with self-contained pump and oil reservoir.

Specially designed for the manufacture of brake linings, this 2,000-ton upstroking press has a self-contained motor-driven pump and oil reservoir.

specialists in press design and construction

Fawcett
PRESTON & CO LTD.



We specialize in the design and manufacture of presses for special purposes and production techniques. Wide experience of the needs of industry enables us to build hydraulic presses for widely varying duties. If you have a special pressing or baling problem, Fawcett technicians can adapt a standard machine to your specifications or, if required, design an entirely new press to fit your production requirements.

A hydraulically operated testing rig with electric motor-driven pump.

FAWCETT PRESTON & CO LTD BROMBOROUGH CHESHIRE *TEL ROCK FERRY 2201 (5 LINES)*

A METAL INDUSTRIES GROUP COMPANY

FP8/1608

Beautiful Yorkshire

Swaledale and
Village of Muker

BIRKBYS LTD · LIVERSEDGE · YORKSHIRE

"ELO" SYNTHETIC RESIN PRODUCTS

Embracing Completed Mouldings, Moulding powders, Resins, solid, powdered, or in solution, Insulating Varnishes, Cements, Lacquers, Anti-friction resins for fabric bearings, Capping cements, Filling Compounds, Sealing fluids.

London Office: 79 Baker Street, W.1.

FINE GRINDING AT HIGH SPEEDS

CONTRA-ROTATING DISCS AT SPEEDS UP TO 12,000 r.p.m. WITH COMPLETE SAFETY

FINE GRINDING PLANT

The CONTRAPLEX Wide Chamber Mill illustrated is a sieveless stud mill for grinding all soft and medium hard materials to a high degree of fineness, quickly and efficiently. This machine has been operating on the Continent for many years with remarkable success and the machines are being used by various manufacturers in this country to obtain an improved product in less time.

A free flow of material is maintained between the intermeshing studs on the two discs which rotate at speeds up to 12,000 r.p.m. and the wide chamber prevents build up of fine particles on the chamber walls. The impact at these high velocities, relative speeds equal to 210 metres per second, breaks up the material into the finest particles. The discs have variable speeds and can rotate in either direction so that the widest range of materials can be ground. Additional air can be introduced for cooling or drying.

OTHER ALPINE PLANT INCLUDES:

KOLLOPLEX high-speed sieveless grinder for fine and ultra-fine pulverising of soft and medium hard materials, with controlled automatic vibration feed.

BIPLEX high-speed shearing and friction disc mill for grinding or granulating. The toothed discs have an adjustable clearance and can be supplied of steel, natural or synthetic stone or of special construction.

AIR CLASSIFIERS & SEPARATORS for use in conjunction with grinders or as separate units. With a very sharp separation and fineness down to 2.5 microns, these machines will ensure a uniformity of output to the desired fineness when used with grinding mills.

Please write for details or send your materials for laboratory tests which would be carried out in confidence.

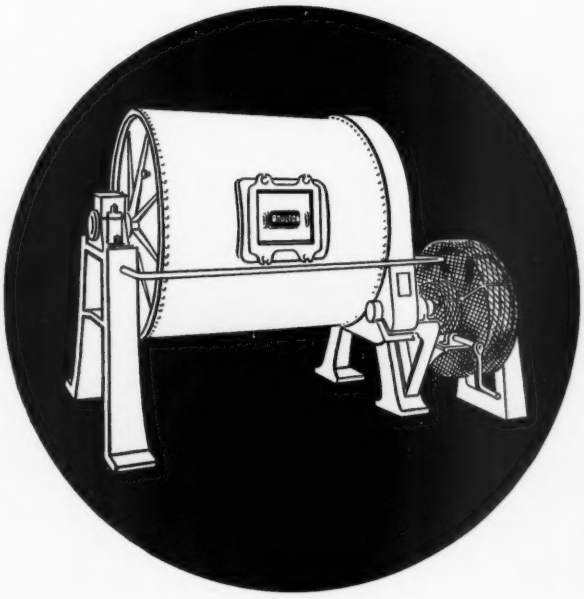
Made by Alpine A.G., Augsburg and distributed in the United Kingdom by

LAVINO (LONDON) LIMITED

KINGSWAY HOUSE, LONDON, W.C.2

Telephone: CHAncery 6137

Telegrams: Lavinolo, Westcent, London



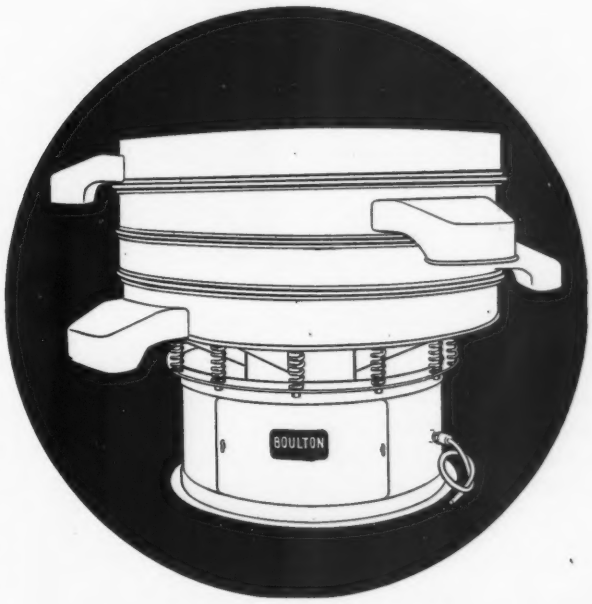
BALL MILL

Machinery & Apparatus for the Plastics Industry

BALL MILLS—up to 8 ft. diameter. In cast iron, steel including stainless steel with mirror finish if desired, porcelain, with alternative linings such as rubber. We also specialise in the relining of existing mills.

GYRATORY SCREEN—the most efficient and reliable machine of its type yet produced. Handles wet or dry materials of all types. Higher output and accuracy. Adjustable motions to suit all types of material. Made in 4 sizes.

GYRATORY SCREEN



William Boulton Limited

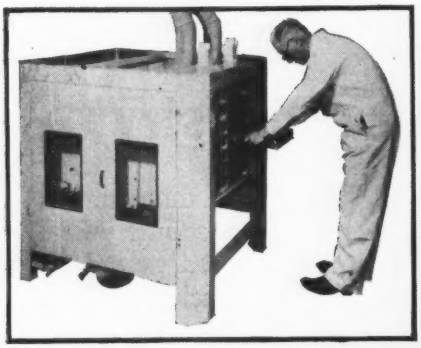
PROVIDENCE
ENGINEERING WORKS,
BURSLEM,
STOKE-ON-TRENT.

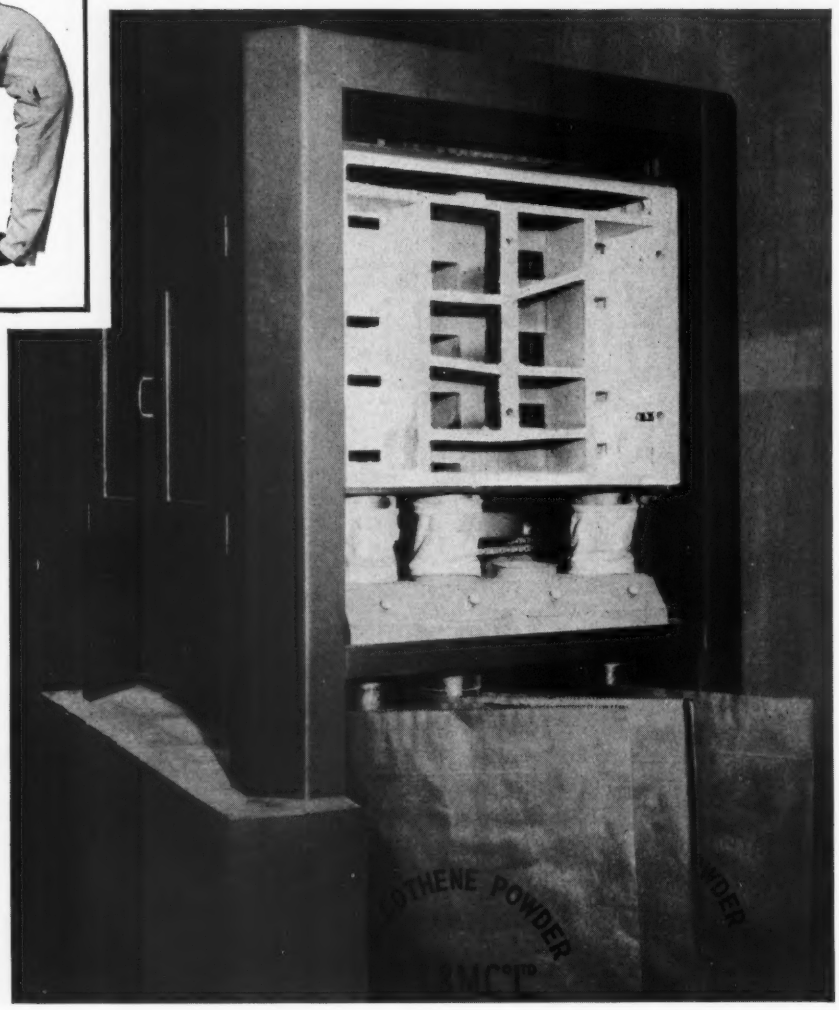
Telephone: Stoke-on-Trent 88661 (5 lines)
Telegrams: Boulton, Burslem.

We design and construct many types of plant for the process industry including filter presses, agitators and mixers—may we solve your particular problem?

WB16

SIMPLIFIED, HIGH SPEED SIFTING OF MOULDING POWDERS with the Simon Junior Sifter





This Junior Sifter, installed at T. C. & M. Co. Ltd., has the side cover removed to show the internal sieving arrangement.

For trouble-free sifting of moulding powders, the Simon Junior Sifter will take a lot of beating. Big names in the plastics industry including Telegraph Construction and Maintenance Co. Ltd., find that Junior Sifters are ideal machines for high-capacity screening, grading and sifting.

The powerful rotary motion of the horizontal sieves gives positive separation with absolutely dust-free operation. Junior Sifters can be fitted with mechanical feeders or they can be incorporated into your existing processing system. Let us talk to you now about your sifting problems.

Industrial plant by **Henry Simon Ltd** SIMON ENGINEERING GROUP

STOCKPORT, ENGLAND

HS 191

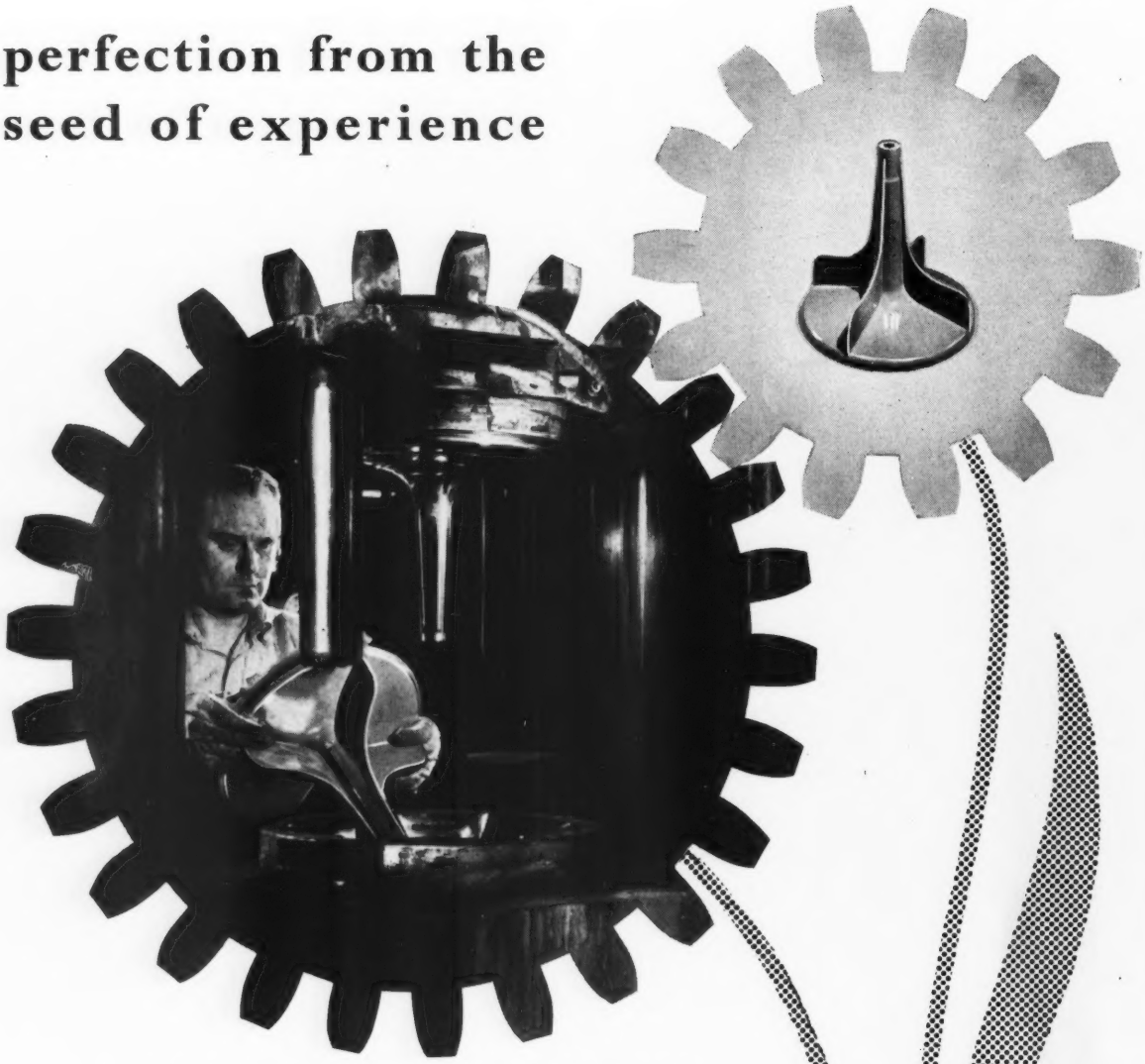
Advertisers communicating with Box P. 181 may hear something to their advantage

One of London's most progressive advertising agencies, which has in the post-war years firmly established and consolidated not only itself but a considerable number of its clients, finds itself in a unique position to handle a substantial plastics account. The agency's name will be familiar to you, as will its high creative standards, which have not as yet been applied in this particular field.

Those advertisers who would be interested to know the unusual circumstances which have now arisen (to the advantage of one of the larger plastics organisations) are invited to communicate with

BOX NO. P. 181, PLASTICS
Bowling Green Lane, London, EC1

perfection from the seed of experience



Perfection in production is the proud boast of the G.E.C., who have acquired an immense fund of knowledge, and built up one of this country's most comprehensive ranges of equipment for plastics moulding during the past 40 years. The ingenuity of this versatile organisation is at your service, to help solve your problem, be it great or small.

This washing machine agitator of phenolic material is a typical example of the large variety of mouldings made by the G.E.C.

G.E.C.

moulded plastics for industry

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

The Power of Paper...

The miner's job is a dangerous one, but his helmet gives him considerable protection. Oddly enough, it is made of **paper.** This is only one of the many ways in which paper, processed by specialists, demonstrates its power. During the last 30 years of nearly 150 years of Papermaking experience Tullis Russell have specialised in technical papers for industry. This vast experience is freely available to all industries at all times.

Tullis Russell & Co. Ltd.
ESTABLISHED 1809

THE PIONEERS OF TWIN WIRE PAPERS FOR PRINTERS

MANCHESTER
372 Corn Exchange Buildings
Corporation St

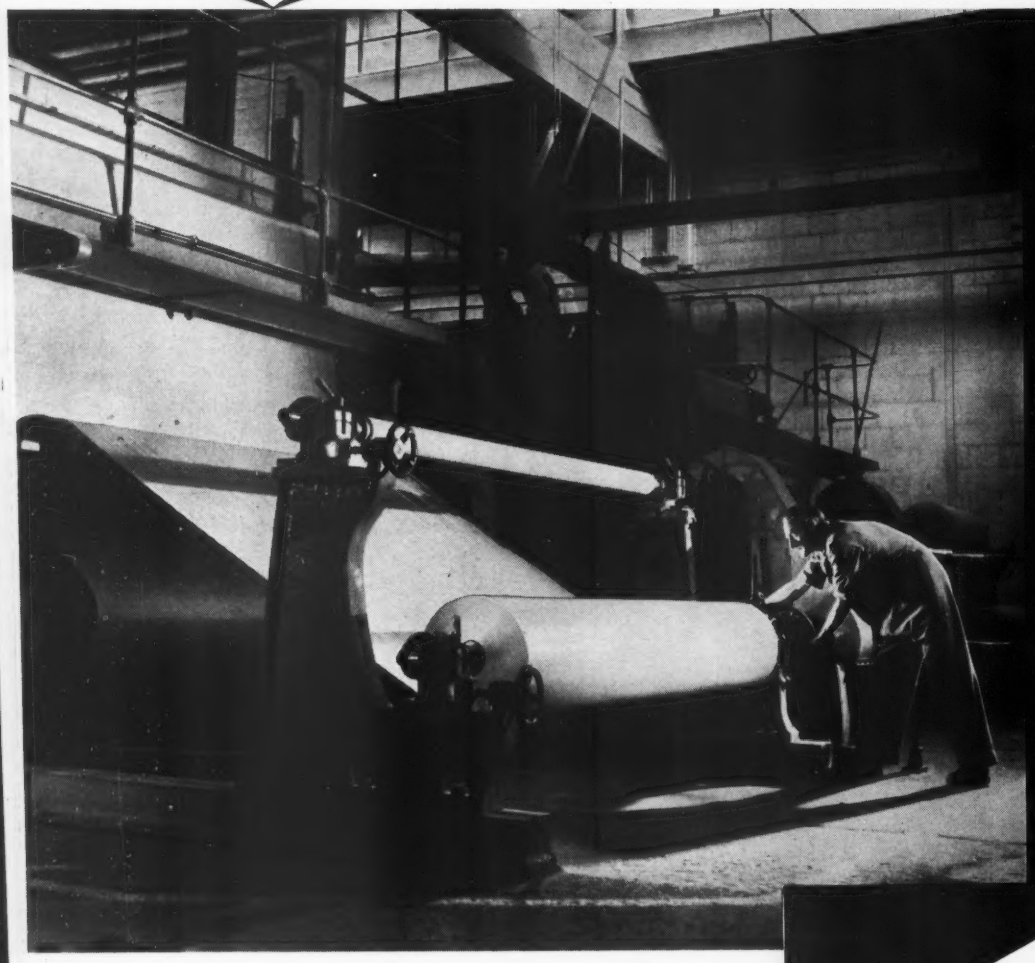
BIRMINGHAM
177 Corporation St

LONDON
'Ivorex House'
Upper Thames St E.C.4

SCOTLAND
Auchmuty & Rothes Paper Mills

BACKGROUND

TO BETTER LAMINATES



Different properties of BAKELITE *Laminated ar emphasised in manufactu by varying the base materials. Asbestos, for example, increases heat resistance, fabric provides impact strength, and pape of various kinds are used for electrical insulation. In this photograph, paper is being reeled after passing through a large impregnator. It will subsequently be cut into sheets for laminating under heat and pressure.*

Hundreds of hours of machining time have been saved in aircraft, automobile and other factories by the use of BAKELITE Laminated for jigs and tools. Because of its easy machinability, it is used to make drilling, routing, and spindle moulding jigs, bending blocks, stretch-forming tools, profile gauges, and assembly fixtures. Its light weight is of great importance when large jigs have to be handled. The expanding jig shown is used for stretching metal ring sections to final shape and size. All the segments are machined from BAKELITE Laminated.

Expanding jig used in Engine Division of the Bristol Aeroplane Co. Ltd. Segments machined from BAKELITE *Laminated P.992.*

BAKELITE PLASTICS

TRADE MARK

First and still Foremost

Producers of ***Bakelite*** *Laminated Sheet, Rod & Tube · **Bakelite** Glass Fibre & Asbestos Laminates · **Bakelite** Phenolic, Urea, Alkyd & Silicone Moulding Materials · **Bakelite** Polyester Resins · **Bakelite** Phenolic & **Urea** Resin Cements & Adhesives · **Vybak** PVC Moulding & Extrusion Compounds **Vybak** Rigid & Flexible PVC Sheet · **Warerite** Decorative Laminated Plastics*

Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

PROPRIETORS: TEMPLE PRESS LIMITED

CHAIRMAN and MANAGING DIRECTOR: ROLAND E. DANGERFIELD

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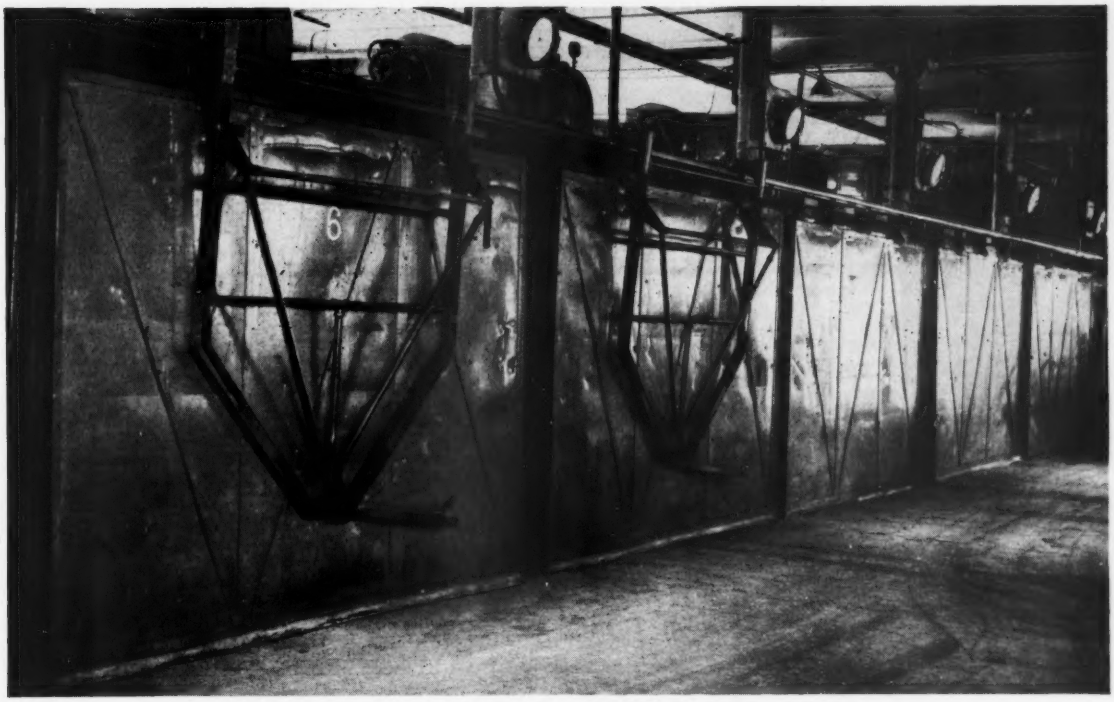

Battery of curing ovens for cast phenolic resins at Waltham Abbey Works of Catalin Ltd.

the newest thing in an old material

for the first time the four principal parts of the domestic water cistern are bituminous mouldings

Cistern showing well with stand pipe cemented in position. The smooth shape of the outside wall of the stand pipe and the inside wall of the bell make the quick action of the syphon possible.

The moulded bell. A cast iron cap is cemented above the water line to give the weight necessary for satisfactory action.

The new ABM cistern and lid, bell and stand pipe are all moulded from Telenduron by National Plastics — and the float is injection moulded from flexible polythene. Careful design and the use of this well tried plastics material make a cistern that will not corrode, that is quite free from electrolytic action, that is quiet, reliable and trouble free and needs no applied finish.

Design work was carried through by National Plastics engineers in collaboration with ABM technicians. Moulds were designed and built by National Plastics and the improved grade of Telenduron material used is an exclusive National Plastics product.

NATIONAL PLASTICS

TELENDURON

NATIONAL PLASTICS (SALES) LTD.
Sales organisation for BRITISH MOULDED PLASTICS LTD.
Avenue Works, Walthamstow Avenue, London, E.4 . *LARkswood 2323*

NP26

Plastics

VOL. XX. No. 218 SEPTEMBER, 1955

EDITORIALS

Conference at Geneva

THE meeting in August of the highest scientific representatives of 72 countries to discuss the peaceful uses of atomic energy will clearly go down to history, not only as one of the most important steps towards future peace in a troubled world, but also as one of the happiest of volte-faces by Governments away from a situation fraught with danger, for the very same knowledge can, as the world knows only too well, be turned to war as well as to peace.

There were exciting things to hear from many parts of the world on the advances that are possible in medicine and surgery, in metallurgy, chemistry and in plastics production, but for the older industrial nations—Europe and perhaps for Gt. Britain more than any other—the most important immediate news was that which gives us so much hope that the new fuels will make us less dependent on coal.

Gt. Britain has been using up her great resources of coal for more than 400 years and her energy needs are now vastly greater than they were 50 years ago when output was 240,000,000 tons, some 20% more than they are today. The rest of Europe is comparatively poor in coal and augments its fuel requirements with wood and water power. As for petroleum no important discoveries (other than the very recent one in the French Landes district) have been made in Europe outside the well-known, and in many cases long-worked, deposits in Russia, Rumania, Poland and Hungary. All has to be imported. With few exceptions all European countries are now petroleum refining countries. With no exceptions, all countries in the world are consuming petroleum at an increasing rate. To this we may add that the world resources of coal and of oil are steadily being exhausted.

The basic difficulties that face Gt. Britain in keeping its industrial place in the world are perhaps only greater in size than those of other nations and not in kind. All are moving forward to the same end: a better standard of living in which the use of energy must greatly increase. All European countries rely largely on coal and those that can win it from the ground are subject to the same difficulties as our own of diminishing resources and of diminishing supplies of labour. On the other hand, we possess no great forests and no water-power to speak of.

Thus the promise of atomic energy in making a third fuel available to us seems as a beacon in a dark world and all eyes have turned to the Cumberland experiments, working on plutonium and uranium 235, with new hope.

In this work we appear to be more advanced than any other country, and Dr. Dunworth of the Harwell station gave the additional news to the Conference that the research on thorium as yet another fuel has progressed sufficiently in Gt. Britain to suggest that 15 tons of it yearly could supply all Gt. Britain's needs for electricity.

Britain's Fuel Needs

THE speed with which we have tackled the job of beginning the production of electricity from atomic energy deserves the greatest praise of all concerned. It is probable that in 10 years we shall be producing nuclear power to the equivalent of 5 million tons of coal a year and by 1980 something of the order of a maximum of 50 million tons.

While this effort promises to be one of the greatest this country has ever undertaken, it is no less important to see the results in their true perspective or what we believe it will be in 1965 and 1980, for the demands of energy here and elsewhere increase rapidly.

A sobering discussion of the whole problem recently published in the *Esso Magazine*, shows clearly that the solution to our energy problems will not be to hand in the next 25 years nor even in 50 years' time.

The reason is not far to see, for the estimate of our industrial growth is of the order of 3% per annum or an overall increase of 30% by 1964 (equivalent to an 18% increase in our energy requirements). Since in 1954 we consumed as energy the equivalent of 250 million tons of coal (utilizing coal and oil) we shall need the equivalent of 295 million tons by 1964. The part played by oil must steadily increase.

Thus we have for 1964:

	coal equivalent million tons
Estimated Energy needs	295
Estimated Coal Production	250
Less exports	15
Plus nuclear power	5
Net Coal + Nuclear Power. Total	240

Thus there remains a gap of 55 million tons of coal equivalent to be filled by the only other available fuel—petroleum.

For 1980 the figures are even more enlightening:

	coal equivalent million tons
Estimated energy needs	500
Estimated coal production	250
Nuclear power	50
Balance for oil	200

Gt. Britain built up her great industries because of her vast coal resources. The time is fast approaching when oil will be required in quantities almost as great as the amount of coal we need. Then without doubt we shall be feeling the impact of atomic energy as a fuller partner in our new industrial era. By then, too, we shall know much more about atomic energy, coal will be used economically and we shall be able to strike a balance between the three fuels more easily.

The Radio Show

WE are in process of seeing, we suppose, the extinction of the radio cabinet by the television set, a change that seems inevitable on economic grounds alone, for television can, and on occasion already does, take over both jobs. At present there is a hard core of listeners who "wouldn't be seen dead with a television set," a hard core of radiogram

fiends and another of small radio-cabinet porters who want radio while working, swimming, travelling on the railway and probably also when sleeping, and who will be satisfied only when television becomes portable.

Whatever happens, it will be all one to the plastics industry since some kind of container, functional and/or decorative, will always be necessary. With a growing appreciation among members of the radio industry of the flexibility of plastics, so far as design capabilities and the economics of the problem are concerned, and with an end to the foisting of costly, phoney Chippendale and Palladian designs on a gullible public, we shall see more clearly the place of plastics in the production of these miracle inventions for late 20th century homes.

Some measure of what can be done was seen at the Radio Show this month. Ekco, as ever, has been adventurous. One example which gave us great pleasure employed Warerite, the well-known decorated laminate in much of its construction and we look forward to the time when individual decorative work, " paintings " and " black and white " and other designs, will be common. Frets of " Tygan," polystyrene and polyvinyl chloride fabrics and mouldings and of p.v.c. embossed and decorated sheet were also much admired on several new cabinets. In all there seemed more moulded cabinets on show than we have seen in past years.

One of the most interesting of new developments was shown on a cabinet made for one of Murphy's new television sets. The cabinet was made by the resin impregnation of paper pulp, the pre-form thus produced being finally pressed and cured in matched moulds. Readers may remember that Mr. Carl Martin, once of Bristol Aeroplane Co., Ltd., gave a lecture on this subject during the war, before the Plastics Institute and showed some interesting pressings made thereby. It is pleasing to note the resuscitation and improvements made in the process during the past few years by Fibre Form, Ltd.

MOULDING POWDER AND SHOT

On The Right Lines

The new Deutsche Kunststoff-Institut recently founded in Darmstadt is obviously more than being a German equivalent of our own Plastics Institute as its name might imply, for it will comprise when complete, laboratories and workshops and a range of plant to carry out both scientific and technical research on a wide scale. The organization will include a staff of physicists, chemists and engineers and the means to establish a literature service for members and non-members. What is especially interesting is that the new institute has been founded by the Forschungsgesellschaft Kunststoff, a union of 189 firms who, together with assistance from the State of Hesse, will meet the cost of the buildings and maintenance.

◆ ◆ ◆

Modern Pest Control

I have seen some aspects of pest control in years gone by, especially in flour mills in this country, where a yearly or two-yearly destruction of insect and animal life ranging from moths to mice is carried out by the release of prussic acid gas within the mills after complete sealing. But the most modern method of all, at least for a private house in tropical countries, against the wood destructive termite and borer appears to have been adopted in a century-old house near Sydney, once lived in by George Blaxland, the well-known explorer who opened up the Western Plain of Australia. The treatment includes the draping of the house completely in an envelope of " Visqueen " polythene sheet. Once the house is covered and the edges of the plastic tent have been rolled together and clipped with metal clips, the lower edges, which overlap the ground by about two feet, are sealed off by being loaded with sand. Inside the house, which remains fully furnished throughout the operation, are several containers of highly toxic methyl bromide. These containers are then allowed to release their gas, the house remaining under the treatment for a period of 24 hours. After this the gas is released to the atmosphere where, on contact with the fresh air, it immediately loses its toxic qualities. Obviously this is a very efficient method of termite destruction probably the best by far for old houses, but it makes me wonder whether the methyl bromide which is a gas at ordinary temperatures and evaporates completely, would protect the wood against further attacks. In such countries it would seem necessary to impregnate wood before construction of the house is begun with one of the well-known anti-termite compounds that remain permanently in the wood.

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Wropt In Mystery

I am, as you doubtless know, the world's expert on sausages, having been weaned on the products of the original monopolists, the two ancient universities of England, and having graduated inch by inch and then yard by yard on the tiny " garapata " of Mexico, the " gendarme " of old Savoie and the long " chú," pronounced " chú," of Hungary. It grieved me greatly, therefore, to read the announcement that pork sausages had gone up by 4d. a pound to 3s. 2d. because pork itself has doubled in price within a few months and that the cost of skins for chipolata has also doubled in the same time. On the face of it, this seems to indicate that there was 4d. worth of pork in one pound of sausages before the rise, but this would be an error. There was more; it is no use applying your simple arithmetical methods to this vast problem. However, the most interesting part of the news at the moment refers to the sausage skin itself, for I well remember receiving, about the year 1926, the report by a famous American research body—the Mellon Institute, I believe, on the production of sausage skin by extrusion of viscose. I think this manufacture has succeeded very well, so that you have only to watch the financial papers and the prices of cotton, sulphite woodpulp or newsprint to find how your sausages will move. I note also that the Dutch, whose fault has always been " asking too little and giving too much," have also now covered their smoked cheese, sausage-like, in a 10/1,000-inch thick skin of tough protective extruded viscose.

DOGSBODDY.

Production Story

Although in the early stages of development in Britain, alkyd moulding compositions hold great promise for the future. We give here a report on their successful use for high-quality mouldings by Insulators Ltd.

WHAT may be described as the twin ideals of the moulder have always been quality in his moulding compounds and efficiency in his plant. The development of compression moulding since 1912 has been constructed largely on these two principles, each dependent upon the other. At various stages, the industry has been able to take pride in the improvements which have been achieved, both in quality and price of mouldings. We have seen a successive chain of developments commencing with the ureas and later the melamines, coupled at the same time with outstanding new developments and improvements in the phenolics, always extending the scope of moulded articles.

Moulding for the Electrical Industry

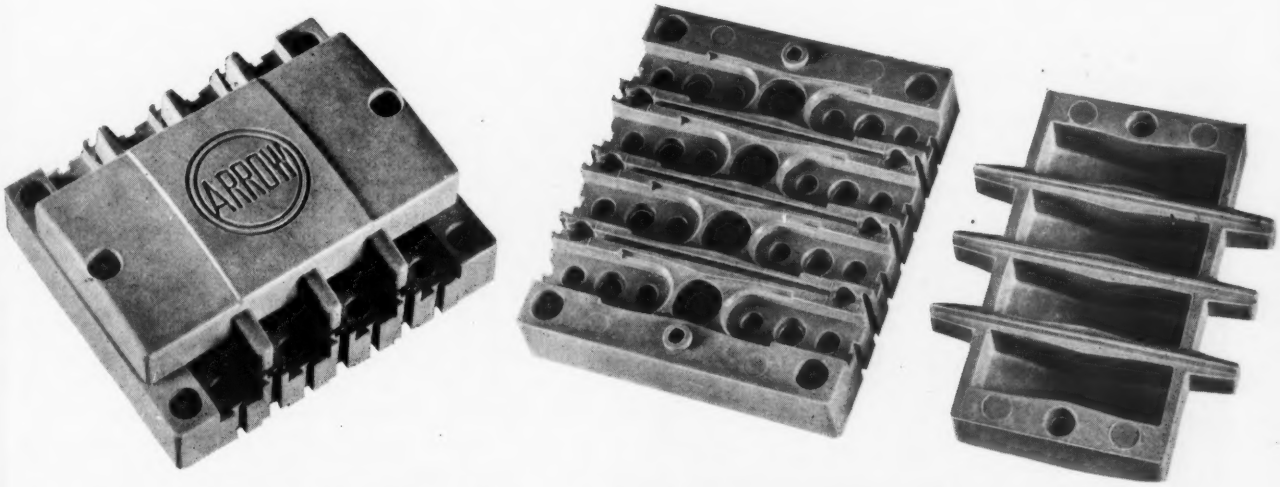
Of special importance has always been the electrical industry, which has not only constituted the largest single customer of the compression-moulding industry, but which has also, in turn, given birth to moulding units of its own, to wit E. K. Cole, Ltd., G.E.C. and many others. The requirements of the electrical industry have naturally been stringent and deep interest has therefore been expressed by the moulders in the latest group of plastics to enter the compression-moulding sphere, the alkyd compounds. These are of the first importance because of their excellent arc resistance, outstanding dielectric strength and high insulation resistance at high humidity. They have also made possible a closer approach to the other ideal, speed of cure which, in turn, brings significant economies in the moulding costs. This speed of cure is such that very few of the traditional presses are fast enough in closing to take advantage of these materials. We have therefore seen significant developments in press design to take charge of this important feature. A typical cure time for an $\frac{1}{8}$-in.-thick disc is 12 seconds at 300° F.

First Alkyd Mouldings

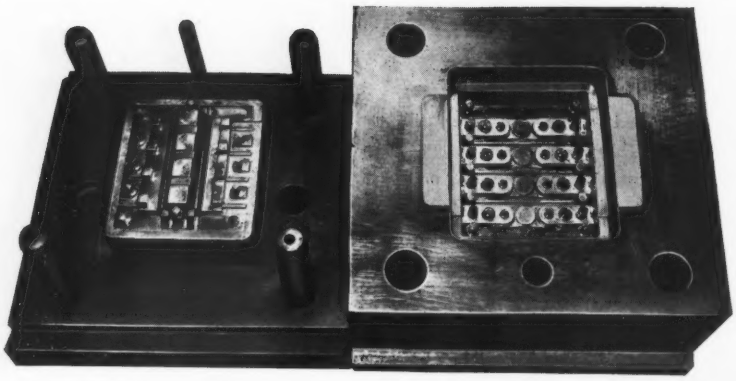
One of the first companies to commence production with these new materials has been Insulators Ltd., first formed as a company in 1926. This organization takes its place as one of the oldest and biggest of Britain's compression-moulding units and today, although maintaining its fundamental compression-moulding interest, maintains also an extensive injection-moulding plant to take charge of the steadily increasing market for thermoplastic mouldings.

Factory Organization

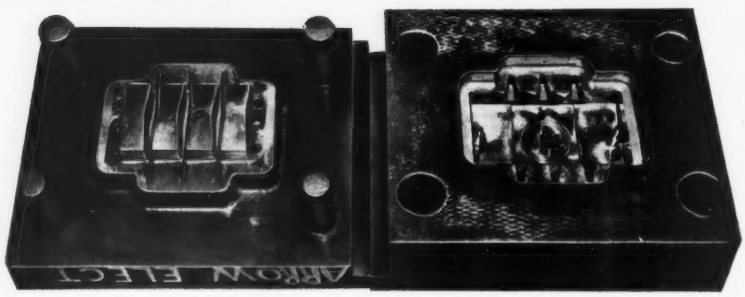
The organization is based on three factories; the head office and main works are at Edmonton, devoted exclusively to compression moulding. Here press capacity ranges up to 1,000 tons. At Jarrow, in the North, is a self-contained plant also devoted to compression moulding. At Paddock Wood, in Kent, is a modern injection-moulding shop with capacities ranging from 1 to 32 oz. Each of these three units is self-contained, maintaining in each case its own toolroom, and the overall payroll is in the order of 600. Insulators Ltd. were therefore well qualified to undertake the experimental



(Left) Contactor base and hood in position. (Right) Hood and base apart to show detail.



(Left) Tool for contactor base. Experience has shown that tools for these alkyd compounds give best results when chromium plated, due to the abrasive nature of the powder. Design of moulds can undergo considerable modification, due to very low shrinkage of material on cooling.



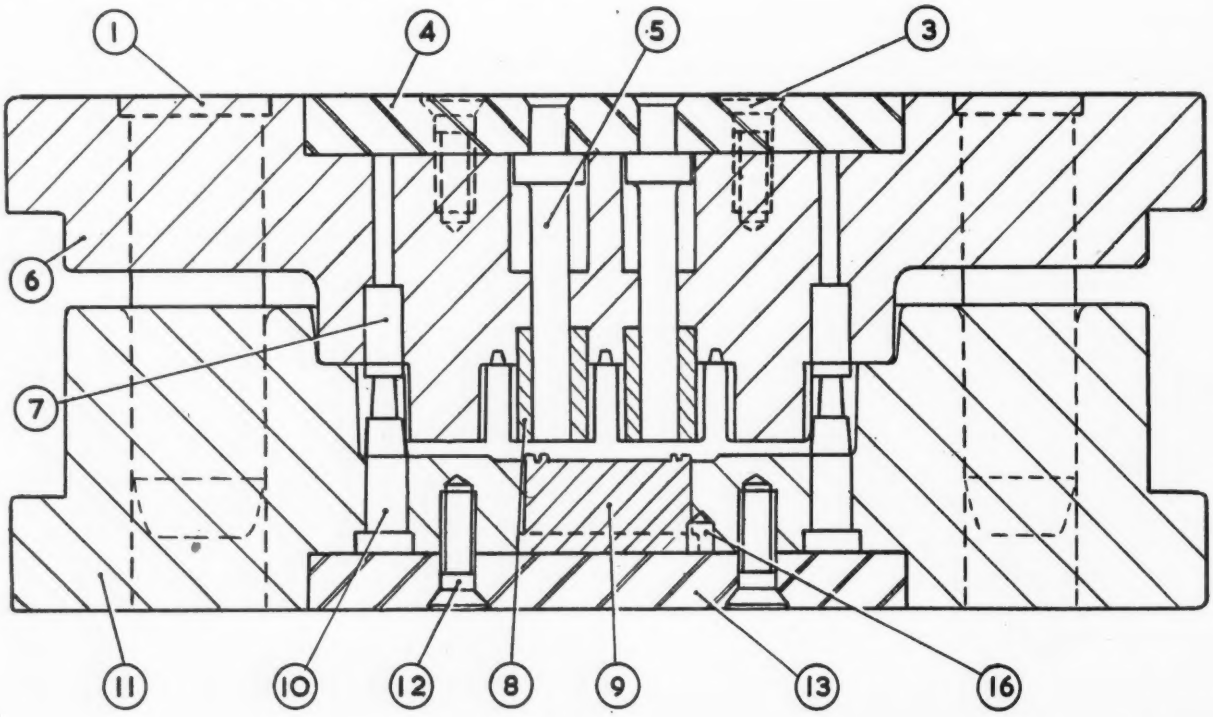
(Right) Tool for first contactor hood. A detailed drawing is shown below, taken from the original drawings of Insulators Ltd.

work that was necessary to mould these new alkyd compositions at production rates.

In this Production Story we are concerned with two contactors, each comprising hood and base, moulded for Arrow Electric Switches Ltd., of Hanger Lane, London, W.5. These contactors are designed to give an electric strength of 250 to 300 volts per mil., with a surface resistivity of 10^{14} ohms. The effective contribution of alkyd moulding compounds to this important electrical component may be judged by the fact that the arc resistance is superior to the next best material by more than 50%.

The basic design was supplied by Arrow Switches and the drawing office at Insulators prepared a series of tool designs which were costed and submitted to Arrow. Following agreement on tool costs and moulding charges, the tools were then put in hand, bearing in mind the very substantial

Key to drawing below :— (Extracted from Drg. No. MT 8989/1, supplied by Insulators Ltd.) 1. Guide pin; 3. Allen c/sk screw; 4. Back plate; 5. Ejector pin; 6. Top punch; 7. Moulding pin; 8. Pad; 9. Engraved pad; 10. Moulding pin; 11. Bottom die; 12. Allen s/sk screw; 13. Back plate; 16. Locating pin.



difficulties in moulding procedures between these materials and those which had formerly been employed.

Production

At the outset it was found possible to modify the contactor design considerably, with great advantage to the finished product, by virtue of the superior electrical properties of the alkyd compositions. At the same time it was necessary to take into account the shorter cure time involved.

Mr. Charles Waghorne, director and general manager of Insulators, paid a special visit to the Arrow Hart Company in America to study their methods of moulding these contactors in alkyd powders.

The tools having been made, experimental work was then started in the shops. The difficulties involved were, of course, considerable, but the situation as it stands today, production having been put on a regular basis, is that working pressures of between 800 and 1,200 p.s.i. are employed. This is substantially lower than would be used with an electrical grade of phenol or urea. Moulding temperatures are in the order of 275 to 330° F. The material pellets well and the improved cure time has made possible the use of single-impression tools in each case, whereas with slower cure materials at least twin-impression tools would be necessary to meet the production schedule called for by Arrow. The small contactor base has a depth of $\frac{5}{8}$ in. at its maximum thickness and is cured in $1\frac{1}{2}$ minutes, giving an overall cycle of $2\frac{1}{2}$ minutes, including handling. In the identical moulding it is estimated that $3\frac{1}{2}$ minutes would be necessary for the cure alone using a p.f. powder.

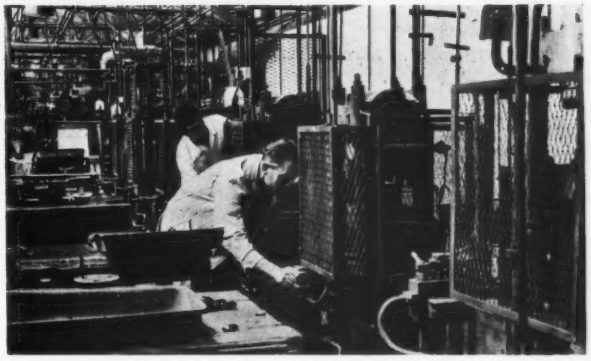
Moulding Precautions

Insulators experiments with the materials indicate that chromium plating of the tool is essential, due probably to the highly abrasive nature of the powder, which is mineral filled. Distortion of the mouldings on extraction from the die is very low and mould shrinkage ranges between .004 and .007 per in. This in itself greatly assists design, promoting more accurate moulding, and from the overall aspect rejects are substantially lower.

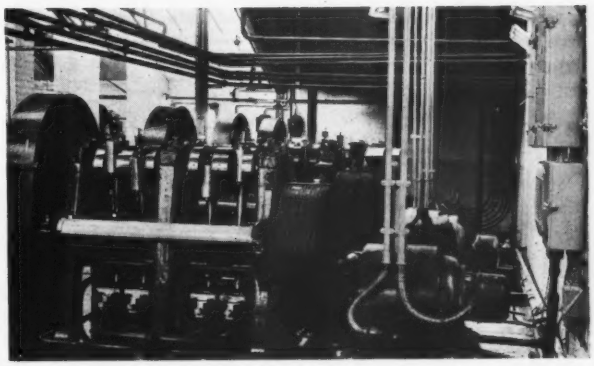
The greatest disadvantage lies in the brittleness of the material, which shows itself when moulded holes are punched clear or if thin sections are left in exposed positions, where sudden impact may cause fracture. In the case of the latter, only mould design which takes into account this disadvantage can satisfactorily overcome this problem; in so far as finishing is concerned, great care must be exercised to avoid rejects due to brittleness.

Insulators Ltd. are very properly proud of the success they have achieved with this new, and hitherto in this country, little-known, moulding composition. The company takes the view that the cost, at the moment roughly $2\frac{1}{2}$ times that of p.f. or u.f. moulding powder in the case of the American imported alkyd, is amply justified where the application calls for a precision component. We may expect, of course, to see a steady reduction in this price and one manufacturer at least hopes to market a fast-moulding alkyd at 2s. 11d. per lb. in the reasonably near future. These reductions will extend the scope of the moulding compositions themselves and thus greater experience be gained by moulders in their use.

Toolroom at Edmonton works.



A bay of the Edmonton moulding shops.



Pumps and accumulator for hydraulic fluid.

(Right) Mouldings go through the finishing department at the Edmonton plant.

CATALIN'S PROGRESS

Long regarded as the leading specialists in the manufacture of phenolic casting resins, Catalin Ltd. have branched out into many new fields since the early days before the war. A brief record of these developments follows herewith.

CATALIN is a name long associated with plastics, both in Great Britain and America. Looking back to the first volume of *Plastics* we see no fewer than twelve references to the products of the British Company.

Catalin Limited came into being for the purpose of manufacturing phenolic resins as castings. At that time these were the only readily available thermosetting plastics in shaped forms whose translucency could be varied from transparent to opaque. The market for these materials grew steadily, embracing handles of every description including those for the furniture, cutlery, umbrella and toilet trades, artificial jewellery, fancy goods, articles for games such as counters, dice rod, billiard balls and bowls, and many other applications of an industrial nature and the works at Waltham Abbey were enlarged as a result. Extensive batteries of ovens to cure the cast resins were built, the largest in Europe, and to these were added a series of resin kettles ranging in capacity from a few hundred pounds to several tons. A research department backed by extensive laboratory facilities completed what was at that time a unique establishment in the phenol formaldehyde cast resin field. There is little doubt that despite the advent of numerous other types of plastics, cast phenolics still occupy a unique position owing to their versatility and the special effects which can be obtained with them.

War Production

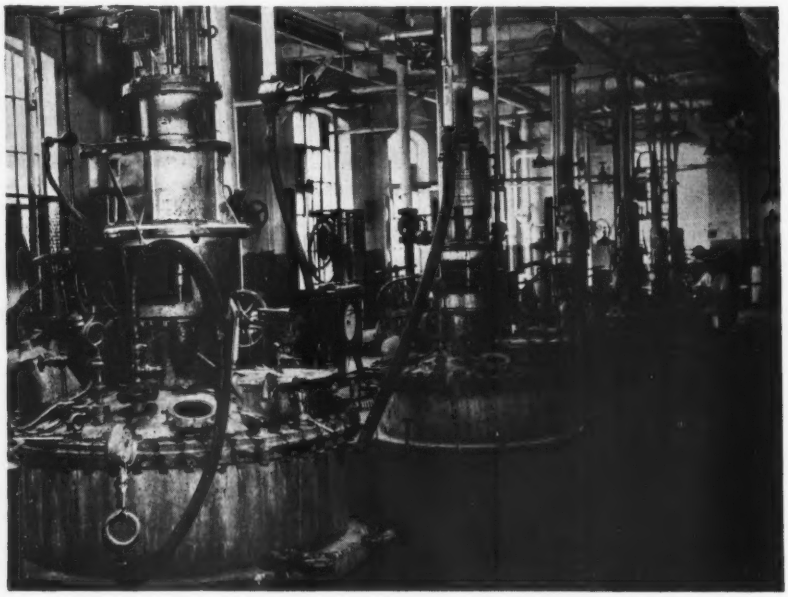
With the advent of war, Catalin were asked to switch a large part of their resin manufacturing to glues. Considerable quantities of Catalin adhesives were made between 1939 and 1945, much of which was used in aircraft construction, particularly in the Proctor and the Mosquito. The Company also played a significant part in work with Barnes Wallis on the Dam Busters. This expansion in the types of products manufactured has continued in the post-war years. Cast resins are still manufactured in quantity and the Company has extended its interest not only to consolidate its position in the industrial resin field but also to develop fabricated products ranging from pit prop caps for use in the mines, reinforced shuttles for the textile industry and welded articles.

These developments have naturally been accompanied by a progressive increase in plant capacity.

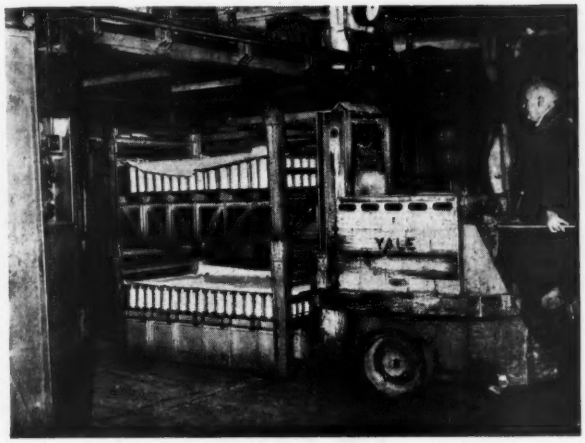
On the industrial resin side, Catalin's contribution to the foundry industries is of special interest. This industry has, during the course of time, employed a variety of naturally occurring binders for fabrication of sand moulds and cores. During the early part of this century, the use of linseed and other oils as sand binders became firmly entrenched, but although the use of these materials should not be decried it has been accompanied by certain inherent defects, in particular, weakness on account of low bond strength, slowness of cure and poor storage characteristics.

In recent years the formulation of phenolic resins capable of giving high bonding efficiency at low proportions of resin to sand coupled with rapid curing

Part of the extensive laboratories for research and production control at Waltham Abbey



A battery of resin kettles, with capacities of from a few hundred pounds to several tons.

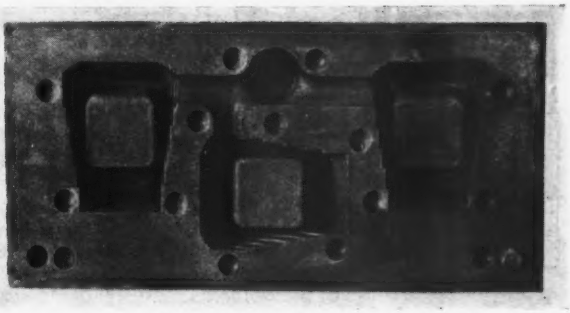


Lead moulds, filled with the cast resin are trucked into one of the curing ovens.

characteristics has led to the gradual replacement of oils as binding media. Further advantages which accrue from the use of phenolic core binders are increased strength, better storage characteristics and greatly improved surface finish of the metal casting. Catalin have further increased their service to the foundry industry by the introduction of mould sprays for improving the finish of castings prepared in both dry and green sand moulds and by the use of their Cataform series of casting resins for the fabrication of foundry patterns.

Shell Moulding

Of perhaps greater importance to the foundry industry is the development of the shell moulding process. In this field Catalin have been well to the fore in the development of suitable powdered resins, and have recently introduced an especially formulated resin for precoating sand. This resin is characterized by its outstanding flow properties which enable rapid and thorough coating of hot sand with minimum



Vertical view of a typical resin-bonded sand shell, showing excellent finish obtainable.

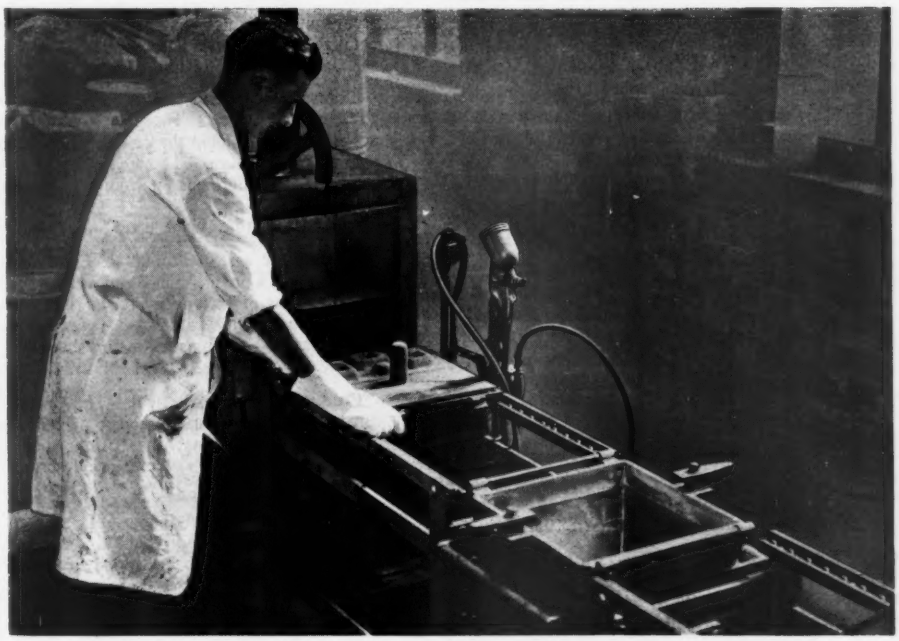
quantities of resin and its rapidity of cure. These factors enable the foundries to achieve a high production rate of shells possessing excellent build, with remarkable hot rigidity, even on the most complex patterns.

Also in the industrial resin field, apart from the wide range of phenolic and aminoplast resins which Catalin offer for a diversity of bonding and casting applications, they offer a comprehensive range of resins and ancillary materials for reinforced plastics fabrication.

Paper Impregnating and Coating

Further rapid progress is being made by Catalin in the sphere of impregnation and coating. A large impregnator incorporating many unique features in design is expected to be " on stream " by September or October of this year. This machine will be capable of producing up to 20 tons per week of impregnated or coated materials. As an adjunct to this Catalin have worked in collaboration with one of the major electrical concerns in the development of a new type of ribbed battery separator, produced from a phenolic impregnated paper, in which the ribs are formed by a crimping operation.

Behind these developments is an extensive laboratory service, covering preparation and synthesis, product evaluation and testing, analysis, and pilot plant and production control. Catalin have based their expanding programme on the proper utilization of these services, which will no doubt in the future be responsible for further important developments.



Shell moulding machine. Operator transfers sand-coated mould from dump-box to oven. This forms part of the equipment in the model foundry at Waltham Abbey.

World's Industry Employs Plastics

MATERIALS and TESTING

Glass-reinforced plastics.—A survey on present and future possibilities has been given by A. Hudson-Davies, referring in particular to hulls for boats, bodies for cars and motorcycles, body panels for railway and road vehicles. Corrugated translucent roof lights are being made in large quantities and decorative panels became popular for interior decoration.
(*Journ. Soc. Glass Technology*, 1955/June/34N.)

Quantitative analysis of synthetic fibres.—K. Vogler gives recommendations for the quantitative analysis and in particular on the accuracy of measurements. Special attention is devoted to a qualitative preliminary testing of the fibres.
(*Schweiz. Archiv f. angew. Wiss. and Techn.*, 1955/July/209.)

Synthetic Rubber Apalon is derived from polyethylene and contains about 27% chlorine and 15% sulphur. It is a vulcanizable elastometer and is compounded with curing ingredients.
(*Machinery* (*Lond.*), 1955/July 8/88.)

Water erosion of methyl methacrylate.—O. G. Engels reports on the mechanism of high-speed water-drop erosion of methyl methacrylate plastic, based on investigations at the Wright Air Research Centre.
(*Journ. Research Nat. Bur. Stand.*, 1955/Jan./5.)

Fluorocarbon polymers for wire and cable industry.—J. A. Jupa gives a survey on the development of Kel-F, which combines excellent electrical properties, extreme corrosion resistance, zero moisture absorption, abrasion resistance, high and low temperature resistance, non-flammability, clarity, high strength and fungus resistance.
(*Wire and Wire Products*, 1955/July/722.)

Joints by injection moulding.—This technique may be used for technical and economical reasons, where jointing by cementing and welding is not practicable.
(*Kunststoffe*, 1955/Aug./357.)

Thermosetting laminated plastics.—A design chart lists the main grades used in design of electronic components. Operating and fabricating factors are given.
(*Design News*, 1955/July 15/53.)

Shelf life of liquid in polyethylene bottles.—The Plax Corp. has compiled a report as a guide for packaging engineers, tabulating extensive data on the permeability of liquids in polyethylene, together with observed weight changes.
(*Design News*, 1955/July 1/114.)

Impact of plastics on engineering.—I. R. Tait reviews the history of the plastics industry. Whilst not divulging new facts, the article gives in a concise and convenient form a general guide to the properties, manufacturers and potentialities of plastics.
(*The Engineering Journal* (*Canada*), 1955/April/414.)
(*Engineers Digest*, 1955/July/316.)

Polyamide bearings.—H. Peckhaus gives a short survey on the properties and the design characteristics of bearings of polyamides.
(*Industrie-Anzeiger*, 1955/July 19/829.)

High polymers.—O. Leuchs surveys the interconnection between the properties of high polymers and those of their molecules. The main criteria are: "shape of the molecule" and the "intermolecular forces."
(*Kunststoffe*, 1955/Aug./923.)

Chemistry of epoxy resins.—The chemical reactions occuring during curing of surface coatings of epoxy resins are discussed by P. Bruin. He deals with hardening conditions, the structure of the required ancillary substances and the properties of the hardened fibres.
(*Kunststoffe*, 1955/Aug./335.)

PROCESSES : MACHINERY

Automatic potting machine developed at National Bureau of Standards is mixing cast resin with a catalist and pours the mixture into electronic components. Operation is continuous.
(*Technical News Bulletin Nat. Bur. Standards*, 1955/June/79.)

Semi-automatic presses are necessary due to the rapid curing of alkyd resins. Presses of an English manufacturer are operating in an automatic cycle, which is controlled by compressed air.
(*Machinery Lloyd*, 1955/July 9/51.)

Large stretch-forming die is made from epoxy resin for forming skin panels for gas turbines and after-burners. A radial force is exerted by shoes.
(*Machinery* (*Lond.*), 1955/June 3/1212.)

INDUSTRIAL APPLICATIONS

Teflon insulation for high temperature use. — Originally restricted, the use of Teflon (Tetrafluoroethylene) for wire insulating purposes has progressed. Its electrical properties are unexcelled and combine with high temperature resistance. Fabricating techniques have progressed considerably.
(*Wire and Wire Products*, 1955/July/776.)

Polyester resin armorplate. — Plastic armorplate of reinforced polyester resin ½ in. thick and 60 to 70% lighter than its steel equivalent will stop a copperjacketed 0.22 caliber bullet, travelling at 2,858 ft./sec. within 18 in. of the muzzle.
(*Design News*, 1955/July 15/12.)

Nylon for conveyors permits resilient, grease-free, and clean service, in spite of higher installation costs. As an example a beer tin filling plant at Peter Houd Brewery Co., Chicago, is described using Nylite plates and Tytel joints.
(*Mod. Packaging*, 1955/May/108.)

MISCELLANEOUS USES

Plastic bearings in dentists' drill.—The National Bureau of Standards has developed, together with the American Dental Association, a hydraulic turbine-driven hand-piece. A minimum of vibration was required at the high speed of 61,000 r.p.m., and for this purpose tapered plastic bearings for both shaft ends of the small turbine were used.
(*Design News*, 1955/June 15/42.)

Pressurized plastic suit.—Description of inflated plastic suit of high-grade polyvinylchloride sheet to protect workers against radio-active dust as used in Atomic Energy establishments.
(*Design News*, 1955/June 15/3.)

Reinforced plastics in automotive heaters.—In the 1955 Chrysler models, moulded, reinforced plastic heater housings are very durable, and make them superior to former steel-encased designs.
(*Design News*, 1955/June 1/3.)

Two-piece plastic truck body.—Insulated milk truck produced by new moulding technique in which batches of resins are catalized progressively.
(*Design News*, 1955/July 15/34.)

Transparent plastic boxes are used for packaging of collets. The plastic containers are shatterproof, keep the contents clean and free from moisture. They can be used in shop or toolroom as permanent storage containers.
(*Modern Machine Shop*, 1955/July/196.)

Plastics for refrigerators.—R. E. Wallenbrock reports on technical and economical investigations of International Harvester Co. During the next 10 years a four-fold increase of the demand for plastics is foreshadowed.
(*Refrig. Engineering*, 1955/Febr./37.)

Production of plastic drill.—The production processes in the manufacture of a small, precision drilling machine using mainly plastics for structural elements are described.
(*Machinery Lloyd*, 1955/July 9/70.)

Flame-spraying Polythene. — Details of flame-spraying a polythene compound, whereby the surface to be coated need only be heated to 150°-190° F. prior to baking, are given.
(*Chemical Engineering*, 1955/August/148.)

LETTERS TO THE EDITOR

Correspondents are reminded that a stamped and addressed envelope should be enclosed in all cases where a personal answer is desired. It is understood that any letter received may be published at the discretion of the Editor.

Erratum

SIR,—It has been brought to our notice by R. H. Windsor Ltd. that we have unwittingly allowed a possibly ambiguous statement to be published in the article "Extruding Unplasticized P.V.C.," which appeared in the August issue and referred to the activities of this company.

In the paragraph headed "Machinery," we were quoted as making the following statement:—

"The extrusion machinery which has been developed for unplasticized p.v.c. by Extrudex Ltd. is basically the Windsor R.C.100 twin-screw extruder. Alterations have been effected incorporating screws and barrel of their own design."

We subsequently approved this when reading the proof of your article. Since our interpretation was one of sincerity, we did not realize that this could have ambiguous meaning.

In fact, we intended to state that we had incorporated minor alterations and modifications affecting the barrel and the screws of the machines, which none the less remained R.C.100 machines. We would ask that you be good enough to publish an editorial comment in your journal regarding the ambiguity of the statement made in this article, since it was not intended to infer that Windsor machines were not capable of producing unplasticized p.v.c. pipe. We were, in fact, discussing extrusion units as a whole and were including take-off equipment, as well as extruders, in our comments.

We now appreciate that certain items taken out of context with the original statement could well be interpreted as being ambiguous. Our statement should have read:—

"Minor alterations and additions to the screw and barrel have been effected by Extrudex Ltd., to their own design. The extruders are still, in fact, R.C.100 as supplied by R. H. Windsor Ltd."

EXTRUDEX LTD.

Western Road,
Bracknell,
Berks.

Plastic Strip

SIR,—We are desirous of obtaining a quantity of plastic ribbon suitable for use in the manufacture of light fittings. May we inquire if you could inform us of any firms which are manufacturing such material?

S. MORRISON AND PARTNERS.

103 Belper Road,
Derby.

Polystyrene Mouldings Required

SIR,—We shall be much obliged if you can let us have some names of firms who manufacture mouldings in plastic, particularly polystyrene.

MULLARD HORTICULTURAL LTD.

Bakeham Lane,
Englefield Green,
Egham, Surrey.

T-profiles

SIR,—Could you give us the names of suppliers of T-profiles in, for instance, polystyrene, cellulose acetate, p.v.c. or copolymer.

N. V. NEGUM.

Nieuwstraat 99,
De Bilt (U),
Holland.

Small-bore Tubing

SIR,—We are interested in obtaining bulk supplies of rigid p.v.c. small-bore tubing, extruded to close tolerance.* Our known field of supply is very narrow and we should be grateful if you could advise us of any likely suppliers of this material.

BRISTOL REPETITION LTD.

Feeder Road,
Bristol, 2.

* In sizes (a) .121 in. o.d. × .097 in. i.d., (b) .134 in. o.d. × .097 in. i.d., (c) .158 in. o.d. × .097 in. i.d., (d) .175 in. o.d. × .112 in. i.d.

Sheeting for Handbags, Etc.

SIR,—One of our New Zealand customers is anxious to obtain a representation of a reliable British or Continental manufacturer of plastic material suitable for ladies' handbags, curtaining, etc., and we wonder whether you will be good enough to give us the names and addresses of firms making such materials.

W. A. SPARROW AND CO., LTD.

32 Hadham Road,
Bishop's Stortford,
Herts.

Plastic Spray for Building

SIR,—We have recently come across an article headed "Vinyl Plastic Sprays in Building," on page 212 of the July issue of *Building Materials*.

In connection with this, our friends, Messrs. Aerograph and Co., Ltd., suggested approaching you as you might be able to put us in touch with the manufacturers of the material in question.

We await your news and remain,

Yours faithfully,

KINSLOR MANUFACTURING CO., LTD.

2 Ronalds Road,
Holloway Road,
London, N.5.

Dip-coating Metal and Wood

SIR,—In the June issue of *Plastics* you published a photograph of a p.v.c. dip-coated plate rack. This interesting picture has opened up a new train of thought for us and we should like to obtain details of the process involved, and to know if it could be applied to wooden articles.

E.C.A. PRODUCTS (WESTERN) LTD.

56 Godstone Road,
Kenley,
Surrey.

Plastic Trays Required

SIR,—I wish to obtain a large quantity of plastic trays size 18 in. × 12 in. × 3 in. high. These are simply for catching dust, etc., and can be moulded from 30-60-thou. acetate sheeting. I should be grateful if you would kindly forward me the names of firms who can supply the material and who can effect the moulding of same.

J. E. HOARE.

20 Marion Court,
Tooting,
London, S.W.17.

Bath Tubs and Sinks

SIR,—I am having a house built, and wonder if you would be kind enough to give me the names of any manufacturers who are offering bath tubs and kitchen units of glass-polyester (preferred) or acrylic material.

Yours faithfully,

J. HIRSCH.

8 Harbord Street,
London, S.W.6.

Glass Reinforced Plastics Inquiry

SIR,—As regular readers of *Plastics*, we shall be glad of advice and information.

Can you tell us please the price range of chairs made in Great Britain from glass-reinforced polyester materials? Is it also possible to find out the quantities made each year, and the trend in sales.

Finally, have you any information on the parallel American market. If you are able to put us in touch with any organization that can give us detailed advice on these questions we shall be most grateful.

MANUFACTURE D'ISOLANTS ET OBJETS MOULÉS DE LA COMPAGNIE GÉNÉRALE D'ÉLECTRICITÉ.

163 Boul. de Stalingrad,
Vitry s/Seine,
France.

[EDITOR'S NOTE: Semtex Ltd., à Dunlop company have made chairs, distributed by Multi-Spring Ltd. A photograph and brief details were published on page 117 of the April, 1955, issue of *Plastics*.]

PLASTICS
IN THE SERVICE OF MAN

A pictorial review of high-quality units moulded or otherwise fabricated in Great Britain . . .

59. Plastics on Holiday - II

A list of trade-marks and companies mentioned in this review, with full names and addresses, appears on page 323

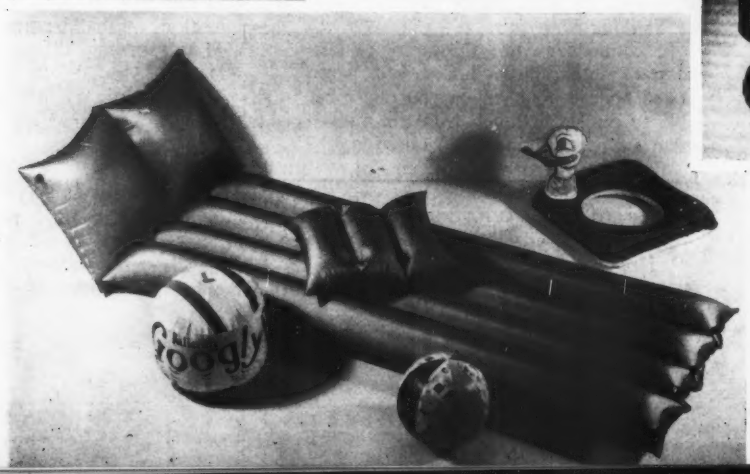
(Above) Swimwear bags fabricated and printed by E. S. & A. Robinson Ltd., from Velbex p.v.c.

(Above) Both attractive and useful when travelling are these p.v.c. toilet bags made by Redman and Sons Ltd. They are fitted with the Flexigrip plastics fastener.

(Below) Variation in design in picnic ware moulded in urea by Universal Metal Products Ltd.

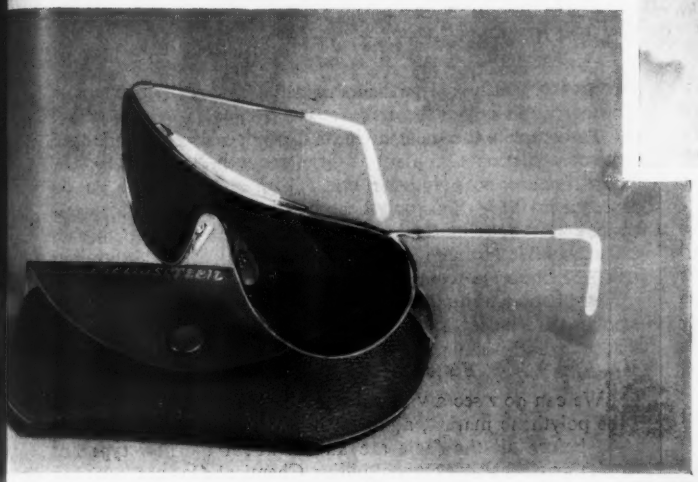
(Above) Not a conventional sailing craft but a 16 ft. Catamaran built for the Hayling Yacht Co. Ltd. The floats are constructed from Bakelite polyester reinforced with glass fibre and were made by Shawcraft Models Ltd.

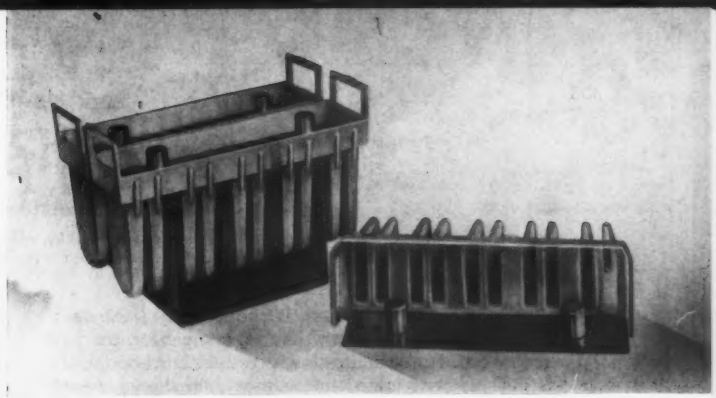
(Below) The "Purma" camera moulded from Bakelite phenolic moulding powder.



(Left) Beach toys for all ages fabricated in p.v.c. supplied by B.X. Plastics Ltd., and made by A. P. Welding Co. (cushion and mattress) and Cascelloid (balls and duck).

(Below) Helioscreen sunglasses manufactured by Messrs. Jameson and Co., incorporating Bexoid acetate in the frames.

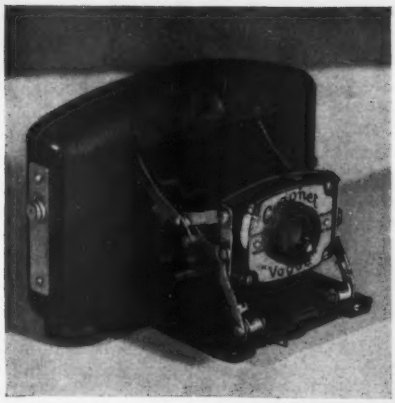




(Above) To assist in cooling you down, these ice lollipop moulds are made in polythene by J. F. Kenure Ltd., for Aero Pipe and Glass Co. (*Plastics*, 1953/Feb./43.)

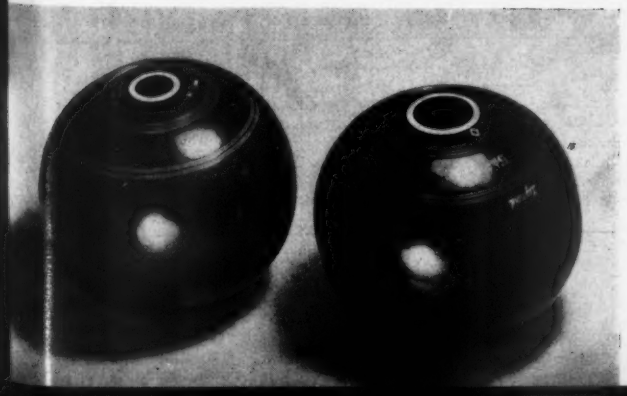
(Below) Picnic ware moulded in Beetle paper-filled urea by The Streetly Manufacturing Co., Ltd.

(Below) Sand moulds to decorate your sand-castle moulded in cellulose acetate by Wood & Kotek Ltd. (*Plastics*, 1950/July/199.)



(Right) Coronet Vogue camera moulded by E. Elliot Ltd., in Bakelite material.

(Below) For the less energetic sportsman these bowls (or woods) are moulded in phenolic by Moulded Products Ltd., and machined and finished by Thomas Taylor of Glasgow. (*Plastics* 1950/May/133.)



(Below) Marconiphone T. 36 A.B. portable radio with Tygan covered deck and polystyrene tuning knobs.

The New Polythenes

Only in recent months has reliable information come to hand on the newer developments in polythene manufacture. A précis of the situation at the moment, drawn from various sources, is given below.*

HIGH pressure polythene, first introduced in 1939 on a commercial scale, meets now its first competitor, the new polythenes manufactured under low pressures. Although the issue has not yet been joined in the moulding shops, enough information is now known about the new types of polythene for some interesting comparisons to be made.

The introduction of polythene as a plastic material resulted from work carried out by I.C.I. in the general field of high pressure reactions. The important part played by polythene in the late war is by now common knowledge, and it has since developed as one of the most popular injection moulding materials having a place of special importance in domestic equipment, and is also used in substantial quantities as a packaging media and cable insulation.

The annual production of polythene by I.C.I. in Great Britain is in the order of 20,000 tons per annum. The I.C.I. patents have been licensed to numerous countries throughout the world.

It will be appreciated that very heavy investment was made throughout the development stage of this material. Irrespective of the expenditure on the manufacture of the raw material, now taking place at the olefine plant at the Wilton site, the high pressure reactors necessary to produce the polymer were, and are, extremely costly to construct.

From the time polythene was commercially introduced to the present day, it has been made by I.C.I., and its licensees in various parts of the world. Today, however, the situation is undergoing a very rapid change, by virtue of work carried out in Germany and America, which has resulted in the manufacture of polythene under low pressures with considerably higher catalyst activity than is the case with the high pressure process.

First Low-pressure Polythene

First news of these developments came from the Max Planck Institute in Berlin, where Professor Karl Ziegler announced success with the use of a metal-organic complex acting as a catalyst, based probably on either beryllium, aluminium, gallium or indium. According to information so far disclosed the temperature of operation in the Ziegler process lies between 60° and 200° C., pressures ranging from atmospheric to 2,000 p.s.i.

A number of companies have been licensed by Professor Ziegler to operate this process, among them Petrochemicals, Ltd., in Great Britain, a German consortium consisting of Fabwerke Hoechst and Deutsche Erdoel, and Koppers Co. Inc., Bakelite, Du Pont and Monsanto in the U.S. At least five other American producers have also obtained Ziegler licences.

American Progress

Independent of Professor Ziegler, the Phillips Chemical Company, a subsidiary of Philips Petroleum Company, of Oklahoma, have devised a low pressure system of their own based on a catalyst consisting of highly hexavalent chrome oxide on a 10% aluminium, 90% silica carrier. Here the temperature of operation is reported to be about 155° C., and the only pressure required is that necessary to liquefy the diluent, usually pentane or octane. The pressure may vary from 100 to 500 p.s.i. The Phillips process is understood to be open to licensing arrangement to interested parties and in the meanwhile Phillips Petroleum have commenced production of 40,000 tons a year at Pasadena, Texas, the product to be marketed under the trade name Marlex.

To complete the picture Union Carbide recently announced the construction of a plant at Grangemouth, Scotland, for the manufacture of polythene under high pressures, to go on stream in 1957. This polythene will be marketed by arrangement with Bakelite, Ltd., of Great Britain, and until supplies are available of the home produced material, sample quantities will be imported from the U.S.

Irradiation techniques may throw further light on catalysis polymerization at low pressures.

Future Market for Polythene

We can now see a very substantial change in the pattern of the polythene market, although it will probably be some time yet before all the facts are known about the new types of polythene. Marlex, the Phillips Chemical Co. product, has already undergone intensive trials as a result of the polythene made from the pilot plant. A considerable quantity of test data is available and has been published in certain American periodicals; tensile strengths are claimed of 4,500 p.s.i., over twice that claimed for previously available polythenes. Maximum service temperatures would appear to be very much higher, in the order of 250° F. In so far as the Ziegler process is concerned, a noteworthy feature of the polymer is its critical melting point which some suggest may complicate its manufacture. It has been suggested, for example, that blending and compounding become extremely difficult, if carried out in the normal way, due to its critical melting point, and as a result the polymer has to be sintered as a necessary first step towards the production of a moulding powder.

Price Structure

In view of these rumours therefore it is difficult to suggest any price structure; a low pressure system would be expected to produce a product at a low price when compared with a high pressure method, both from the point of view of plant construction and running costs. Informed American opinion seems at the moment to look for a price reduction.

Although there are many other modifications to the properties of this new polythene when compared with the high pressure materials, the two main features seem to lie in the higher temperature resistance and a higher tensile strength. This being the case we may expect to see closer competition between polythene and polystyrene, particularly in the rubber modified polystyrene, in such items as radio housings and toys. We may see an increase in the use of these polythenes in pipes and fittings, if their claim to better bursting strengths is justified.

These are of course conjectures based mainly on the information at present published. Some comparisons may be made in the table below.

High-pressure and Low-pressure Polythenes Compared

Property	Test method (A.S.T.M.)	High-pressure polymer	Super Dylan (Koppers Co.)	Marlex 50
Specific gravity	D792	0.92	0.93–0.95	0.96
Tensile strength, p.s.i.	D638	1,300	2,800–5,500	5,100
Elongation in tension	D638	—	400–100	518
Heat distortion temp. °F.	D648	107	—	165

* Including *Modern Plastics*, August, 1955, p. 117 et. seq., *Materials and Methods*, July, 1955, p. 88 et. seq., and *Western Plastics*, July, 1955, p. 10.

Thermoplastic Sheet Production

Plant for Large-size Sheet Manufacture Opens at Stroud

The plastics industry will learn with great interest of the development by Erinoid Ltd. of a process for the production of sheet suitable for vacuum forming and other purposes.

A MAJOR outlet for thermoplastics is in the form of large sheets, currently used for vacuum forming, chemical plant construction, shoe soling materials and flooring. The prime consideration for a full exploitation of these markets is the size of such sheets, available in America up to 5 ft. width. In this country development has been hindered by the fact that maximum width of sheet has been 4 ft., and the erection by Erinoid Ltd., of a new plant for the manufacture of wider sheets up to 5 ft. is therefore of extreme interest to the plastics industry both in this country and abroad.

Sheet material, having undergone a conversion process from the raw material stage, is by axiom more expensive than the raw polymer. Successful exploitation of the sheet manufacturing process therefore necessitates the maximum mechanization if the processing cost is to be kept within reasonable limits. With this principle in mind, Erinoid commenced, in 1951, the planning of a major plant for sheet manufacture. By no means a simple task, for reasons which will emerge later, the construction of the plant, installation and experimental testing having occupied two years and only now is the new plant coming into effective operation. The press itself was constructed and installed by Fielding and Platt, Ltd., of Atlas Works, Gloucester. Overleaf will be found our artist's impression of the new equipment, much of which will be self-explanatory.

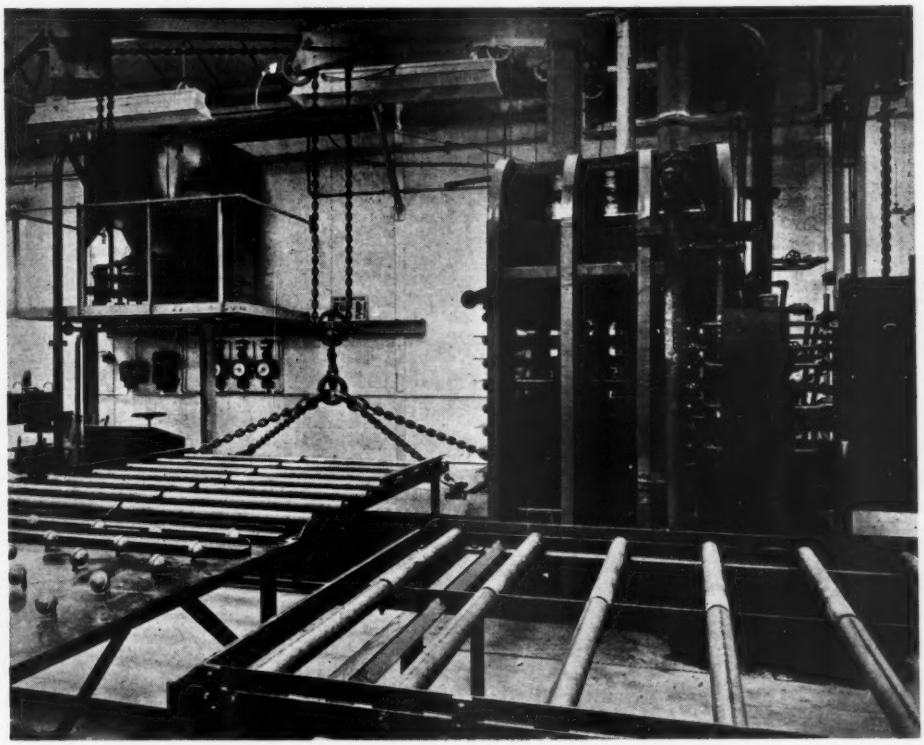
Three Methods of Manufacture

Three methods of sheet manufacture are in operation; in the first case sheets are moulded from powder of special particle size, in steel "picture frame moulds." The second method is to use calendered sheet, laminating this up to ½-in. sheets from base stock 10-thou. thick. The third method is to make use of extruded sheet by a similar lamination process. Calendered sheet is purchased by the company for this conversion process, the extruded preforms being produced by Erinoid themselves. One sheet extruder is already in operation, and another giving sheet up to 60 in. wide is scheduled to be installed towards the end of this year. Amongst the materials to be handled by the press are high-impact polystyrene, produced in sheets up to 5-ft. square, with finishes ranging from matt to polished. Polythene and cellulose acetate are to be produced in similar sizes with similar finishes in the case of the latter. Unplasticized p.v.c. is being made in sheet sizes up to 60 in. by 48 in. In the future, the company proposes to produce foamed polystyrene slabs up to 3 in. thick, 5 ft. square, cutting boards, flooring and shoe soling materials. The plant to make all this possible comprises essentially a Fielding 2,100-ton vertical upstroking hydraulic platen press, the base of which is 9 ft. below ground-level. The pressure medium is supplied from a two-stage pumping system operating on oil.

Press Details

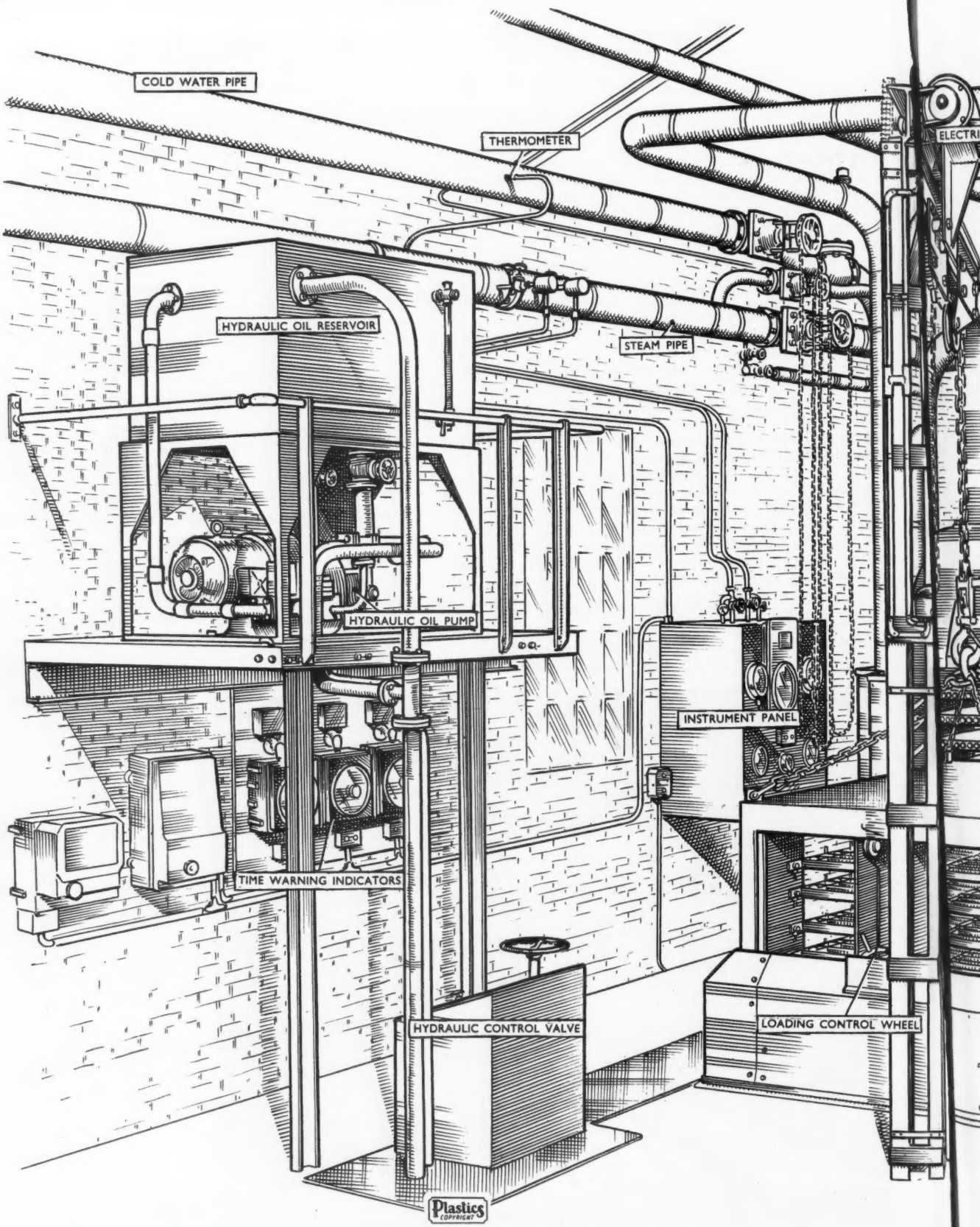
Platen area is 64 in. by 64 in., thickness of the platens being 2¼ in. Nine platens are provided giving eight daylights of 3½ in. each when fully open. The stroke of the press ram is 27 in., and the maximum specific pressure on the material is 1,150 p.s.i., the diameter of the main ram being 37 in. The press closes at up to 11.8 in. per minute, the pressing speed being 1.3 in. per minute. The time to close the press with platens empty is two minutes.

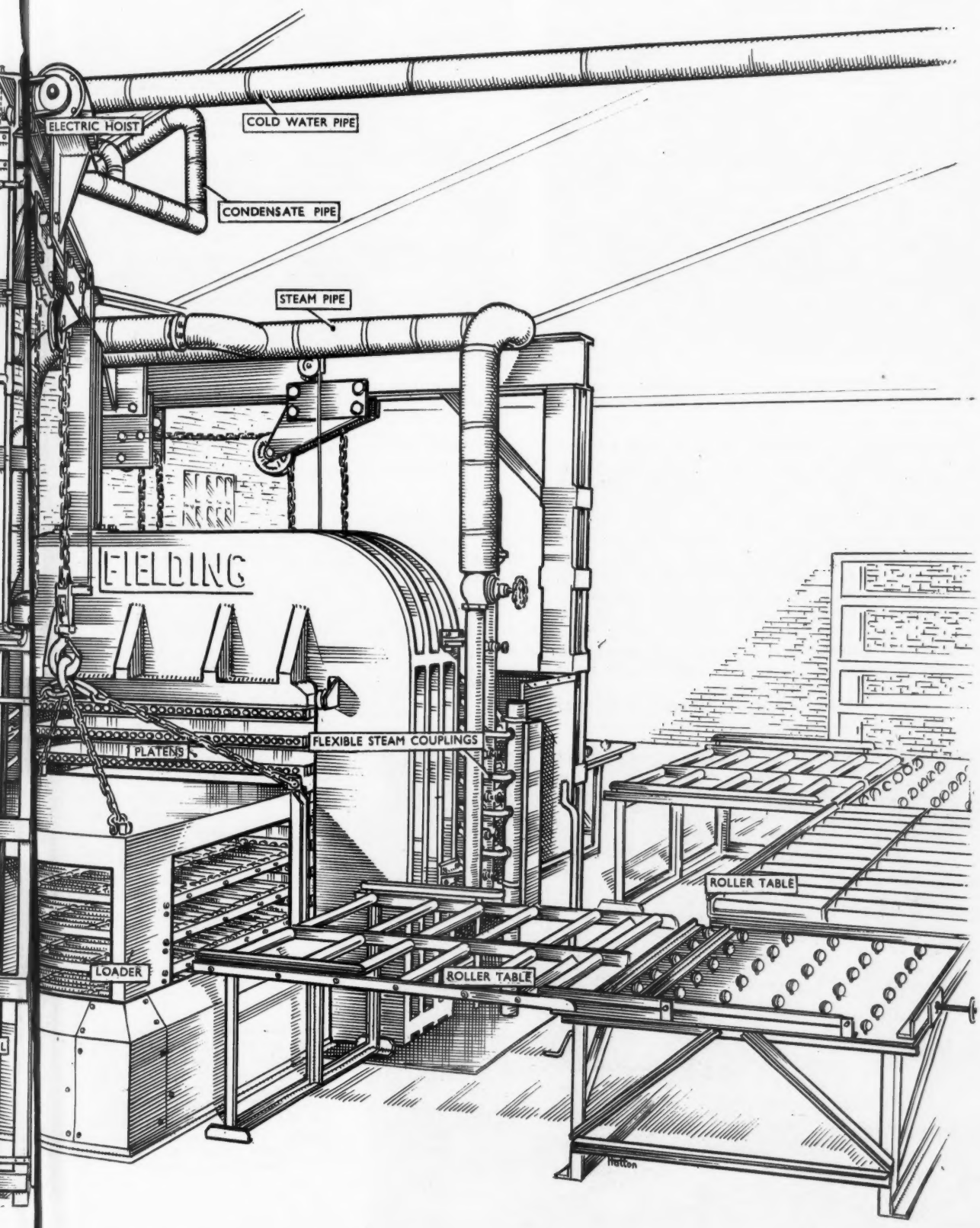
The main press frame is a fabricated steel construction and the ram is carbon forged steel attached to a cast-steel moving crosshead of special ribbed section. This distributes the load of the ram to the platens, and the end of the ram is machined with a slight taper to facilitate the fitting of new packings, as and when necessary.

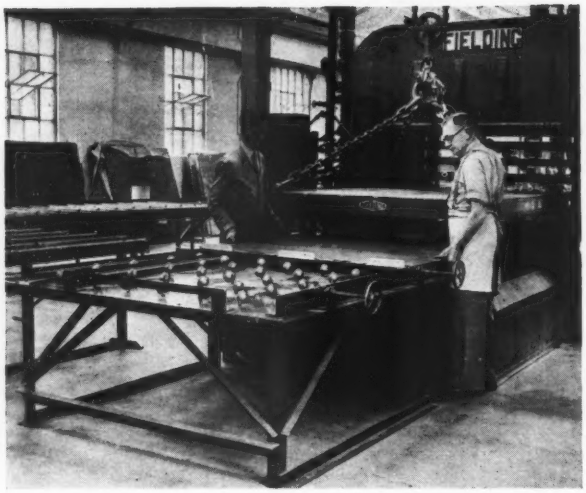


Side view of the press, showing the main frame. The hydraulic mechanism is on the left of the photograph.

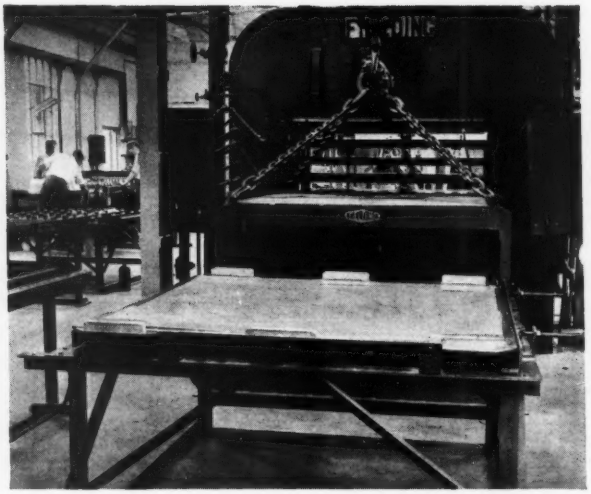
(Text continued on page 312. A detailed drawing of the assembly is shown on the following two pages.)


COLD WATER PIPE
THERMOMETER
HYDRAULIC OIL RESERVOIR
STEAM PIPE
HYDRAULIC OIL PUMP
INSTRUMENT PANEL
TIME WARNING INDICATORS
HYDRAULIC CONTROL VALVE
LOADING CONTROL WHEEL
Plastics COPYRIGHT


ELECTRIC HOIST
COLD WATER PIPE
CONDENSATE PIPE
STEAM PIPE
FIELDING
FLEXIBLE STEAM COUPLINGS
PLATENS
ROLLER TABLE
LOADER
ROLLER TABLE
Hatton



The mould, with the polished sheet super-imposed, is withdrawn from the unloader on to the specially constructed table.



The electric hoist brings the unloader into line with the press daylights. Unloading is in one movement, thus speeding the cycle.

One of the major considerations involved in the construction of this press is the accuracy of the platen faces, and of the press plates. Difficulties in this direction have been responsible for much of the lengthy development work.

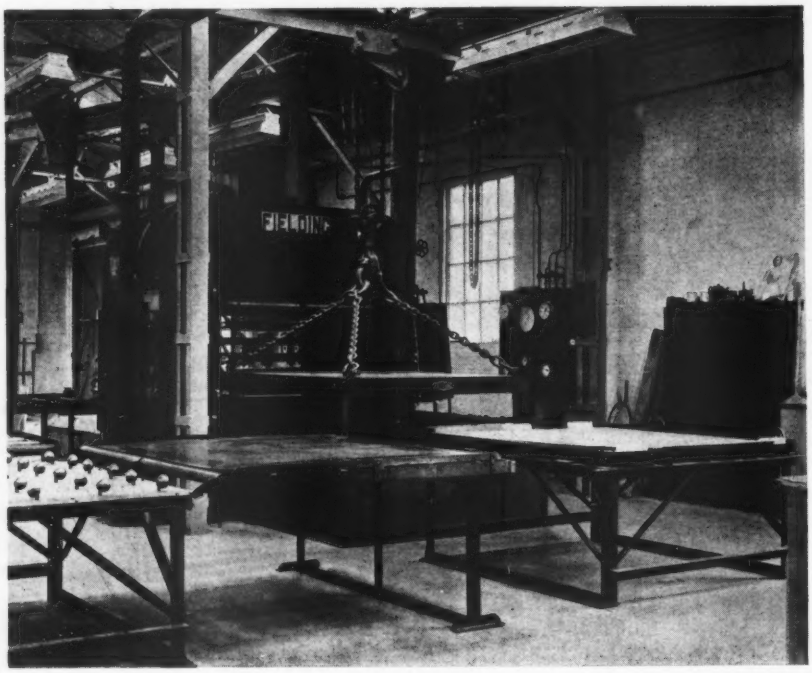
The hydraulic mechanism comprises a Towler two-stage high-speed oil hydraulic pump unit provided with an automatic changeover valve from low to high pressures, being accommodated on a combined motor and pump base-plate. Direct drive is provided by an 18-in. squirrel-cage, flange-mounting electric motor running at 1,460 r.p.m. The oil supply tank, seen to the left of the detailed drawing, has a capacity of 300 gallons and is provided with a cover filter and dial-type oil-level gauge, and is placed over the pump and motor.

Steam, taken from the company's main supply, is delivered at 150 p.s.i. Platen cooling is effected by the use of softened water recirculated via an adiabatic cooler.

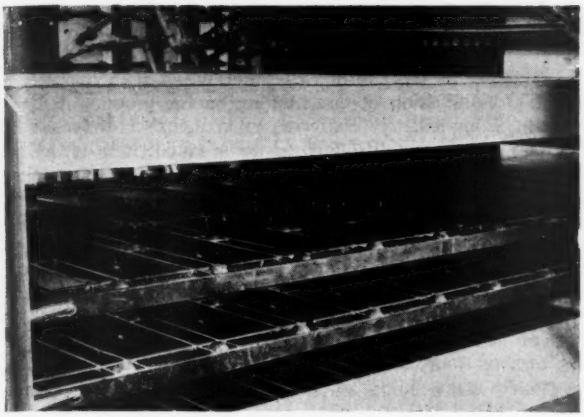
Control

Control is effected by means of a handwheel-operated stop valve provided with pilot valve placed between the pump delivery and press cylinder and arranged to work in conjunction with a solenoid-operated by-pass valve and electric contact pressure gauge. In course of installation is an automatic system linked with the time indicators seen in the detailed drawing, with overriding manual control.

At present, after closing the stop valve, the pump is started and then the "close" push button is pressed to close the solenoid-operated by-pass valve; oil is then pumped into the press cylinder, initially at low pressure, and when the resistance is built up the pump automatically changes over to deliver maximum pressure. Immediately full pressure has been reached the contact pressure gauge causes the solenoid-operating by-pass valve to open and the pump continues to run under light load



Here the moulded sheet and polished plate can be seen separated. On removal of the sheet the mould is moved forward for reloading with powder or preformed sheet, and passed round the conveyor tables to the other side of the press.



Close-up of unloader. Specially moulded phenolic balls permit the easy movement of the heavy moulds.

conditions. At the end of the curing time the stop valve is opened and the oil exhausted from the cylinder back to the supply tank.

Sequence of Moulding Operations

A typical operating sequence, for high-impact polystyrene sheet, would be as follows: The "picture-frame" mould and base-plate are loaded with powder on the roller table adjacent to the loader proper. The top plate (polished) is placed into position and the whole unit is then rolled into the loader. The loader is raised each time until eight moulds are in position. Raised to its full height the loader tables are aligned to the platens with the press fully open. "Picture frame" moulds thus are specially ground for accuracy. This is essential since they control the thickness of the finished sheet. The press is then charged by means of a traversing push mechanism which inserts the eight moulds into the press and ejects the eight moulds containing the pressed sheets produced from the previous cycle of operations. Contact pressure is then applied for a period ranging from five to 10 minutes, at maximum temperature of 175° C. Intermediate pressure is then applied of about ½ ton p.s.i. from five to eight minutes, temperature remaining at its maximum. High pressure of approximately ½ ton p.s.i. is then applied for periods ranging from instantaneous to three minutes. Temperature is still kept at 175° C. The contents of the press are then cooled off under pressure, the temperature falling from 175° down to 20° C. At this point, the sheets are ejected in one sweep into the mechanical unloading device. This, identical to the loader seen in the drawing, is then lowered as each mould assembly is run out on to the roller table. By the use of two complete sets of moulds, unloading of the press is synchronized with loading. This permits of three cycles per hour, producing 24 sheets per hour, and utilizing between 240 and 1,000 lb. of material in that time, depending on the thickness of the pressed sheet required.

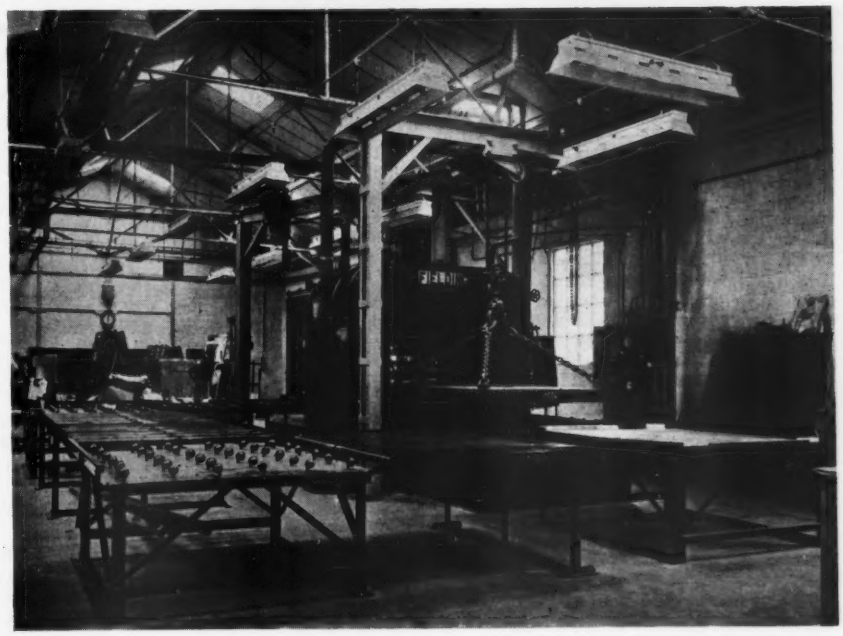
Ancillary Equipment

An interesting piece of plant shortly to be introduced is a radio-active bar which will destaticize the sheet on emergence from the press. At the moment, the polished plate is removed from the mould, the sheet is deflashed and a magnetic gauge is used to size off the sheet. For the future, the use of a Beta ray thickness gauge is contemplated and one will be installed at the new extrusion plant at present in course of erection. The final phases of the moulding operation are inspection of the sheet for colour conformance and imperfections and finally packing or cutting to size according to customers' requirements.

Applications of Sheet

With each material used, pressure, temperatures and time cycles undergo modifications, as a result of the very different flow properties exhibited. It will, therefore, require considerable experimental work still before mass production for all available types of materials can be put in hand. Meanwhile, the vacuum-forming industry, having long awaited a supply of British produced large sheet, will learn with great interest of the development work that has been taking place at Stroud. It is expected that some 70% of the plant's output will go to this branch of the plastics industry. Also high on the list of priorities are sheets for flooring, tank linings and shoe soling, and whilst the plant at present operates on a 12-hour basis per day, it is anticipated that very shortly it will be working 24 hours a day.

In conclusion, we wish to thank the staff of Erinoid who have made possible this report by providing excellent facilities to Temple Press artists, cameramen and editorial staff.



A general view of the press assembly, taken from the opposite end to that shown in the drawing. The table in the left foreground is one of four, each positioned at the corners of the layout. They permit the moulds to move at right angles, and thus change direction. The spaces between are bridged by metal rollers.

Education and Plastics

A RECENT letter to *Plastics* from the Chairman of the Trustees to the Plastics Industry Education Fund disclosed that the appeal launched in May has increased revenue to the Fund from £5,000 to £7,000 this year. This increase of £2,000 whilst obviously being very welcome indeed, is still far short of the target which the Trustees set themselves, namely an annual income of £10,000 per year.

The money is needed to supply bursaries at the various teaching centres for plastics technology, to send members and would-be members of the industry to the universities for degree courses, to supply libraries with textbooks and to generally advance the cause of education to the benefit of the plastics industry.

By permission of the Trustees we publish on this page a list of companies and individuals who have so far assisted in this work. The list is broken down into three parts, those giving money under deed of covenant, those donating as companies and those donating as individuals. A deed of covenant provides for a fixed yearly contribution for a stipulated number of years and the Trustees are then able to claim income tax relief on the moneys received, since the Fund is a charitable appeal. Income tax on donations which may be over a number of years or for a single year only, is also reclaimable.

We urge those of our readers who are members of the plastics industry to read this list with some care. Four companies appear both as contributing under a covenant and also by donation. The total number of companies contributing is 81, out of a present membership of the British Plastics Federation of 300. It is therefore self evident that just over one-quarter of the industry only is at the moment supporting this valuable work. There can be no doubt at all that many have taken the short term view and have excused themselves from the obligation of contributing on the grounds that no benefit is immediately conferred upon them. However, it is not for the present that this money is asked; it is needed to build up a steady flow of trained people at all levels, so that the industry as a whole may in the years to come look forward to steady expansion with skilled personnel available to make this possible. The rate of progress of technology in industry is such that unless the industry takes immediate steps to secure its fair share of skilled people, we shall be left far behind. We must not lose sight of the fact that the plastics industry is one of the few major industries of Great Britain that is without its own teaching centre or research establishment.

Under the heading of personal donations, four names appear. Last May an editorial in *Plastics* suggested that the 2,000-odd members of the Plastics Institute should be approached by the Trustees to the Fund appealing for a small subscription per head, which, with rare exceptions, these members could well afford. On the basis of 10s. per head we could look forward to an immediate increase of £1,000. No Appeal of this kind has yet been issued; may we urge that this matter be reconsidered as soon as possible. Both as individuals and as member companies of the industry, we are all under a similar obligation, and one which should not be regarded in the light of a charitable appeal but as a very necessary form of insurance against the future.

We have asked the Trustees to furnish us with the names and addresses of further companies and individuals donating. These we shall endeavour to publish in *Plastics* on a regular basis.

Donors to the Education Appeal Fund

Deeds of Covenant

Ashdowns Ltd.
Associated Insulation Products Ltd.
Bakelite Ltd.
Birkbys Ltd.
Boake Roberts, A., and Co., Ltd.
Bridge, David, and Co., Ltd.
Bristol Aeroplane Co., Ltd., The
British Belting and Asbestos Ltd.
British Industrial Plastics Ltd.
British Tego Gluefilm Ltd.
British Thomson-Houston Co., Ltd., The
British Titan Products Co., Ltd.
British Xylonite Co., Ltd., The
Cole, E. K., Ltd.
Cosmocord Ltd.
Courtaulds Ltd.
Daniels, T. H. and J., Ltd.
Ebonestos Industries Ltd.
Ferguson, James, and Sons Ltd.
Ferranti Ltd.
Geigy Co., Ltd.
General Electric Co., Ltd., The
Henley's Telegraph Works, W. T., Co., Ltd.
Iliffe and Sons Ltd.
Imperial Chemical Industries Ltd.
Kleeman, O. and M., Ltd.
Kork-N-Seal Ltd.
Metropolitan-Vickers Electrical Co., Ltd.
Micanite and Insulators Co., Ltd., The
Monsanto Chemicals Ltd.
Nettle Accessories Ltd.
Permali Ltd.
Plastic Engineers Ltd.
Prodorite Ltd.
Shaw, Francis, and Co., Ltd.
Stadium Ltd.
Synthite Ltd.
Temple Press Ltd.
Thermo-Plastics Ltd.
Vinyl Products Ltd.
Viscose Development Co., Ltd.

Donations

Aero Research Ltd.
Armstrong Cork Co., Ltd.
Avery, W. and T., Ltd.
Baker Perkins Ltd.
Boake Roberts, A., and Co., Ltd.
British Belting and Asbestos Co., Ltd.
British Geon Ltd.
British Resin Products Ltd.
C.V.A. Jigs, Moulds and Tools Ltd.
Cole, R. H., and Co., Ltd.
Daniels, T. H. and J., Ltd.
Dover Ltd.
Dowding and Doll Ltd.
Dunlop Rubber Co., Ltd.
Duratube and Wire Ltd.
Durham Chemicals Ltd.
Erinoid Ltd.
Evans, Frederick W., Ltd.
Ferranti Ltd.
Flexo Plywood Industries Ltd.
Herbert, Alfred, Ltd.
Hoover Ltd.
Injection Moulders Ltd.
Insulators Ltd.
Kodak Ltd.
Litholite Insulators and St. Albans Mouldings Ltd.
Marley Tile Co., Ltd., The
Melwood Thermoplastics Ltd.
Metropolitan Plastics Ltd.
Oppenheimer Casing Co. (U.K.) Ltd.
Phœnix Rubber Co., Ltd.
Projectile and Engineering Co., Ltd., The
Shell Chemicals Ltd.
Steel, J. M., and Co., Ltd.
Styrene Products Ltd.
Telegraph Construction and Maintenance Co., Ltd.
Tufnol Ltd.
Universal Plastics Ltd.
Utilex Ltd.
Windsor, R. H., Ltd.
Wiggins, Teape and Co. (1919), Ltd.
Yarsley, Dr. V. E., (Research Laboratories) Ltd.
Yorkshire Tar Distillers Ltd.

Personal Donations

A. Brookes.
M. D. Curwen.
C. W. Welch.
E. C. Whitfield.

Educational Facilities in Plastics 1955-56

THE following are brief details of courses available in plastics technology and allied subjects at various centres throughout the country. Prospective students are requested to make contact with the Principal or head of the department concerned for full details.

London: Acton Technical College, High Street, Acton, W.3

Courses for the Associateship of the Plastics Institute are offered both for theory and practical work. There will be a limited number of vacancies in the courses for individuals who may not be able to take the Associateship examination but who wish to acquire a knowledge of the higher chemistry and technology of plastics.

Also of interest is a course on the fabrication and properties of thermoplastics, comprising four afternoons, commencing Tuesday, September 20. This course has been designed for production engineers and planning, design and maintenance engineers engaged in all organizations fabricating and utilizing thermoplastic materials. Practical demonstrations are incorporated in this course.

London: Borough Polytechnic, Borough Road, S.E.1

Full-time courses are available for the Diploma examination of the Plastics Institute and the Associateship examination. Firms interested in sending trainees on part-time day-release schemes should send applications without delay to the Head of the Department of Chemistry. Part-time day courses are arranged for covering D.P.I. and A.P.I. examinations, and here the courses extend for a period of up to seven years.

Evening courses, similar to those available on a part-time day basis are offered, of special interest to science graduates and others of similar level, who wish to obtain the A.P.I. qualification. These evening courses are also of interest to those who wish to study on a general basis the properties and uses of plastics materials.

London: National College of Rubber Technology, Northern Polytechnic, Holloway Road, London, N.7

Full courses are available for the Diploma of the Plastics Institute arranged on a three-year basis. Courses are also offered to cover the Associateship of the Plastics Institute. All courses are supplemented with practical instruction.

Certain facilities are available for post-graduate research work in high polymers and full details are available from the head of the College. A special course on high polymer chemistry will be held on one evening per week.

Birmingham: College of Technology, Suffolk Street

Courses at Birmingham include part-time day and evening studies and full-time day courses for the Diploma and Associateship examinations of the Plastics Institute and the City and Guilds of London Institute certificates. The College possesses well-equipped laboratories, and full particulars of dates of enrolment, syllabuses, etc., can be obtained by communicating with the Head of the Department of Chemistry.

Manchester: Newton Heath Technical College, Manchester, 10

Courses are offered both during the day and in the evening for the Diploma and Associateship examinations of the Plastics Institute and the certificates of the City and Guilds of London Institute. In the case of the former institute, a two-year course, part-time, is offered covering the Associateship examination.

Full particulars of courses available can be obtained from the Head of the Applied Science Department.

Stroud: Stroud and District Technical College, Gloucester

Tuition is available in plant and mould design and materials and processes, and all classes will take place on Monday and Thursday from 7 p.m. to 9 p.m.

City and Guilds of London Institute 1955 Examination Results

THE following results have been published for examinations held in 1955 by the Department of Technology, City and Guilds of London Institute, in the technology of plastics. In each case the class of result is given after the name of the candidate, in parentheses.

INTERMEDIATE

Borough Polytechnic

A. J. Brown (2nd), J. A. Chapman (2nd), L. W. Corneliussen (1st), P. G. Freeman (2nd), A. G. Gray (2nd), R. E. Hackwell (2nd), J. A. Holland (2nd), J. M. Layton (2nd), J. L. Molyneux (2nd), B. Palmer (2nd), M. J. Phillips (1st), C. J. Robins (2nd), C. J. Sims (2nd), I. L. Smith (2nd), Kingsley Smith (2nd).

Birmingham College of Technology

J. Brierley (2nd), D. C. Brown (2nd), R. W. Burke (2nd), K. P. C. Carter (2nd), J. Grice (1st), J. L. Haddon (1st), D. H. Heathcock (2nd).

Newton Heath Tech. College, Manchester

R. N. Smith (2nd), K. Martin (2nd), E. Gutwillig (2nd), A. Smith (2nd), B. A. Rowbottom (1st), H. P. Davenport (2nd), R. Hewitt (1st) (†), L. F. Walker (2nd) (†), K. Lindley (2nd) (†), K. B. Jones (1st) (†), R. Cummings 2nd) (†), H. V. Reynolds (2nd) (†), J. D. McGuire (1st) (†), S. Briggs (1st) (†), G. D. Walmsley (1st), (*), C. D. Dunkley (1st) (*), H. Lindley (2nd) (*), A. H. Hopkinson (2nd) (*), G. Richardson (2nd) (*), J. A. Rogers (2nd) (*), L. Wallace (2nd) (*), J. V. Malcolm (2nd) (*), P. G. Frankland (1st) (*), B. Hodkinson (1st) (*), H. S. Clarke (2nd) (*), K. Burgess (2nd) (*).

Birmingham College of Technology

D. J. Brindley (2nd) (*), A. P. Holliwell (2nd), B. C. Poole (1st), M. D. Roll (2nd), P. J. Rose (2nd), J. M. Speed (2nd), B. Tildesley (2nd), K. A. Turner (2nd), G. R. Wall (1st), F. B. Ward (2nd), A. Wood (2nd), D. A. Worth (1st).

Stroud and District Technical College

G. Brian (1st), K. J. Jones (1st), D. J. W. Sharpley (2nd), A. F. N. Worth (1st).

National College of Rubber Technology, London, N.7

S. N. Angove (2nd), D. A. Dempsey (1st), J. R. Ellis (2nd), T. T. Truscott (2nd), D. H. Williams (2nd).

St. Charles Hospital, London

C. Caristinos (2nd).

FINAL

Borough Polytechnic

L. W. Corneliussen (1st), R. E. Hackwell (2nd), J. M. Layton (2nd), C. J. Robins (2nd), K. Smith (2nd) (*), M. J. Allan (2nd) (*), D. E. Fiddes (2nd), P. H. Lynch (2nd).

Birmingham College of Technology

J. D. Cappell (2nd), L. Hadley (1st), J. B. Hadley (2nd), M. G. Harwood (2nd), D. C. E. Hickman (2nd), R. L. Hughes (2nd), M. A. Newman (2nd), M. A. Parsons (2nd), B. R. Sankey (2nd), D. A. Worth (2nd) (*).

Newton Heath Technical College, Manchester

H. P. Davenport (1st) (*), H. V. Reynolds (2nd) (*), J. D. McGuire (2nd) (*), S. Briggs (2nd) (*), J. A. Rogers (1st) (*), K. Burgess (2nd) (*), J. Townsend (2nd) (*), B. Hastie (2nd) (*), P. G. Wheeldon (1st), M. H. Wraith (1st).

National College of Rubber Technology, London, N.7

J. M. Barber (1st) (*), D. Matthews (2nd), R. A. Wynn (2nd).

* First Paper only.
† Second Paper only.

Synthetics for Industrial Pipe Requirements

Plastics piping and its use in specific fields of application were discussed and criticized by Bryant W. Bradley in a paper presented at the A.C.S. Symposium held recently in New York. We are reprinting extracts from this paper, taken from the July 1955 issue of "Industrial and Engineering Chemistry," believing that the subject matter will be of considerable interest to both producers and users.

AT a recent Symposium on plastics as materials of construction, held under the auspices of the American Chemical Society, several papers were read dealing with the problems which have occurred where plastics piping has been installed and some of the advantages which make its potential use a very feasible and profitable proposition.

Mr. Bryant W. Bradley, of the Shell Oil Co., dealing with the use of plastics pipe in oilfields, said: "It is apparent that the extruded pipe is somewhat more expensive than present materials in line pipe service at 100 p.s.i. from a first-cost standpoint and offers an installation cost advantage of roughly 10 to 1. The one remaining factor to consider in comparing these materials is strength. The data required to design a steel or cement-lined steel system has long been available. Likewise, cement-asbestos pipe has a known working pressure and dependable safety factor, together with many years of successful and satisfactory service. On the other hand, today's extruded plastic pipe has neither an extensive background of service nor sufficient strength data developed in the laboratory to allow intelligent design of a system. As a result, in a few instances, extruded plastic pipe has been exposed to stresses above that which it can withstand for long service, and failures have resulted."

Practical Experiences

"Shell Oil Co. operates and has observed the experiences with 43 such installations containing over 62,000 ft. of either butyrate or styrene copolymer pipe. Fourteen of these installations have experienced failures involving 120 separate pieces. either pipe joints or couplings. Failure of two pieces, involving two installations, were due to misapplications. One piece in each of three systems failed because of failure of the material to withstand the recommended operating pressure, and five pieces, in five systems, failed at pressures above the recommended operating level. However, none of these five installations was operating at a pressure which would cause a calculated burst stress equal to more than 40% of the reported ultimate strength of the material. One hundred and ten pieces in four systems were unsatisfactory because of excessive clearance between pipe and coupling.

"R. H. Carey (*S.P.E. Journal*, 10, No. 3) has clearly shown the wide difference in short- and long-term properties of polythene. Likewise, A. C. Levinson (*Corrosion*, 10, No. 7) has shown a unique way of evaluating butyrate, styrene copolymer and polyvinyl chloride, as well as polythene under load in a strain-stress-time relationship, which clearly demonstrates that the long-term strength of these materials may be only 20% to 30% of that indicated by a short-term ultimate-strength test. It is these long-term strength values that are needed for design purposes.

"Another physical characteristic which would be helpful in design work is the beam strength of the material. Styrene copolymer pipe was installed as water distribution lines in a cooling tower operating at about 100° F. and less than 5 p.s.i. pressure. After one year of this service this pipe has outperformed both steel and galvanized-steel pipe from a deterioration standpoint, although it was necessary to provide supports at 4-ft. intervals to ensure against beam-type failures.

"Since plastics are relatively temperature sensitive, the aforementioned data are needed at temperatures representative of service conditions, i.e., 80°, 110° and 150° F. Although not definitely proved, certain evidence indicates that water causes plastics to have a lower long-term strength than either oil or air; therefore the test data obtained in water would be more desirable for design purposes. Inasmuch as manufacturing variables may also influence plastic pipe strength, it appears that either a given quality level should be met by all producers or that each manufacturer supplies strength data on his production."

Pipes for High Pressures

Having discussed the low-pressure (100 p.s.i.) piping, Mr. Bradley suggests that a ready market is available for a non-corrosive pipe able to withstand working pressures of 2,000 p.s.i. in the water-flood and salt-water disposal systems. A glass-reinforced plastics pipe of 2 in. diameter was installed in a water-flood injection line. The working conditions were: temperature of salt water carried 72° F. to 82° F. The operating pressure averaged 600 p.s.i. and the pH varied from 8.4 to 9.0. The calculated hoop stress at this pressure was 4,800 p.s.i.

After 12 months' exposure salt crystals had formed on the exterior of the pipe, due to the weeping tendency of the pipe. However, subsequent laboratory tests have shown that a high-pressure glass-reinforced plastics pipe has possibilities of development.

Mr. Bradley goes on: "In addition to the burst, fatigue and collapse pressures mentioned earlier for line pipe, it is necessary to have similar long-term data on tension, torsion and compression strength for tubing. Furthermore, since several of these forces can exist simultaneously in tubing, it is essential to know what effect tension and compression stresses have on collapse resistance, burst and fatigue strength. Thornton has shown the type of apparatus that can be used to evaluate pipe in this manner. Thornton's report also points out the importance of stress-time tests of glass-reinforced plastics pipe. Installation of experimental glass-plastic pipe run into a pumping well below the pump for environment tests after 3½ months' exposure revealed no significant change in mechanical strength, although some oil was absorbed during exposure to the produced fluids near the bottom of a 4,000-ft. well. However, these results should not be interpreted to mean that the pipe does not lose strength in the environment. The maximum stress on the pipe during the test was 65 p.s.i. in tension, which no doubt was well below the term strength of the material.

"Development of a competitive plastics tubing capable of operating at 1,000 to 2,000 p.s.i. burst pressure and comparable collapse and tension stresses would open field of water-flood injection-well tubing, as well as corrosive high-pressure flowing oil and gas-well tubing to the plastics tubing industry."

Conclusions

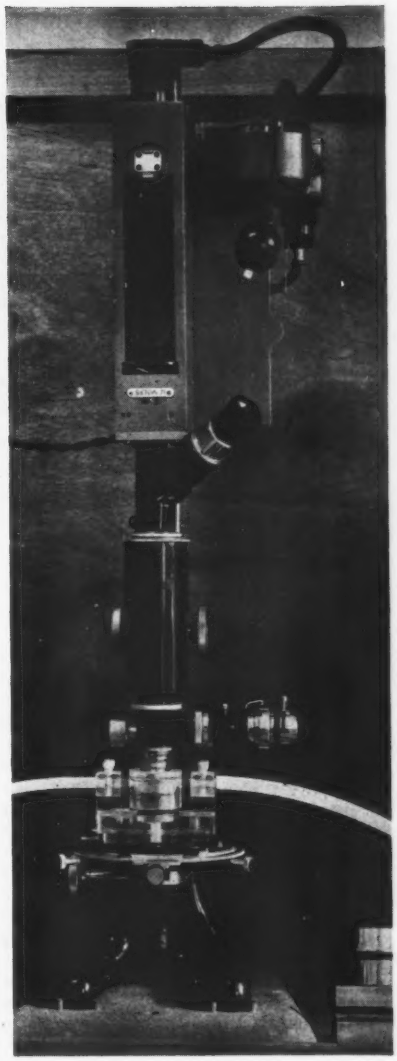
Leaving the subject of piping, the author considers the use of polyester or epoxy glass-reinforced materials for the construction of storage tanks, and again criticizes the lack of sufficient data.

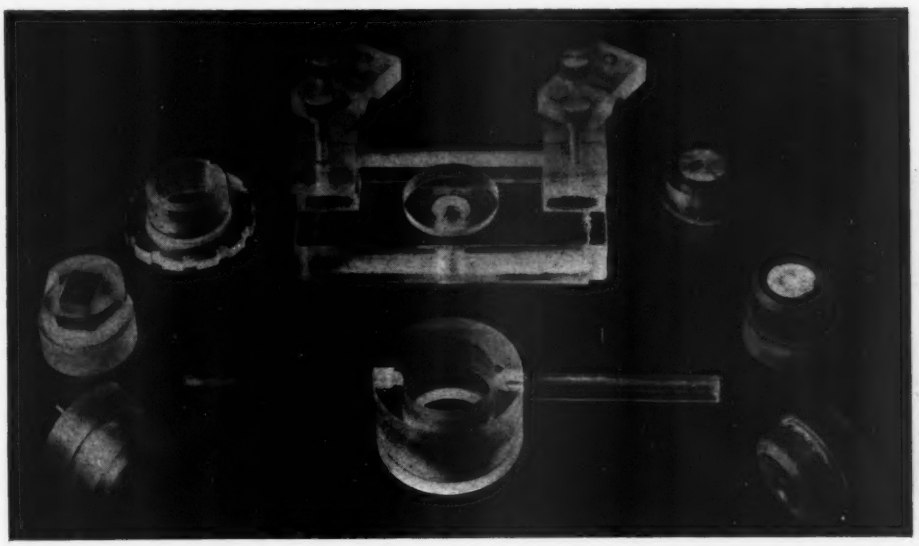
In conclusion, Mr. Bradley says that the further widespread expansions of structural plastics in oil production operations depends on the availability of reliable data as proof of the long-term strength of the material under each of the individual and combined loads to which the material might be subjected.

Experimental Apparatus for the Study of Adhesion

READERS may recall apparatus fabricated in Perspex at the National College of Rubber Technology, described in the September, 1954, issue of *Plastics*. This was a brass plating tank devised as part of a programme of research work into the bonding of polymers to brass. We have now received further information on progress in this field; it has become necessary to study the kinetics of sulphide film formation on the surface of pure thermally equilibriated single-phase brass specimens. The apparatus photographed on this page enables the rate of tarnishing to be studied by making colour film ciné records of the interference colours which become visible on the surface of the metal crystal grains as the thickness of the sulphide film increases. The Perspex cell is designed to allow a single phase alloy to be suitably prepared and electro-polished for examination by this technique. By rotation of the knurled and ground-in stopper one can admit tarnishing solution to the metal surface at the desired moment and simultaneously photograph it whilst the solution flows over it. The cell has been designed by Dr. Norman Stuart of the Northern Polytechnic and its fabrication has been carried out in Perspex by Mr. R. Benham. The photographs were taken by Mr. L. Moulder of the National College of Rubber Technology. Part of the optical equipment for carrying out this research has been purchased on a special grant from the Royal Society. The pure single-phase brass was specially prepared through the kind assistance of Mr. Waterhouse of the R.E. Metallurgy Division, Woolwich.

Apart from Perspex, polythene and Araldite casting resins have been used in fabricating this complicated and highly accurate set of apparatus.





(Top left) Assembled Perspex cell mounted on a slide which exactly fits on to rotating stage of metallurgical reflecting microscope.

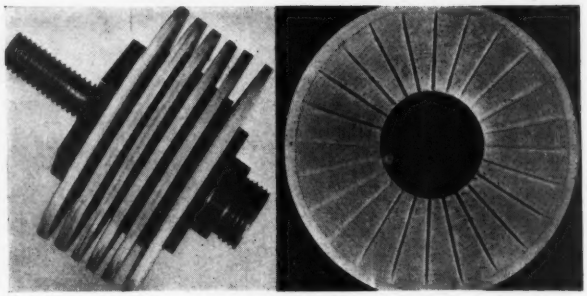
(Above) Microscope, with assembled cell in position.

(Left) Constituent parts of cell, showing high degree of craftsmanship in manufacture.

New Productions

(Left) Sealed relay used in aircraft.

(Right) Flow carbon filters.

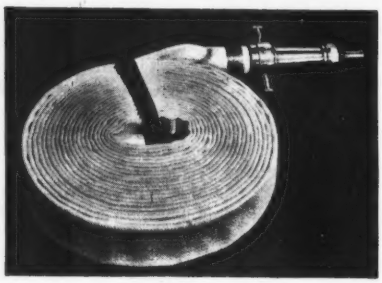


Sealed Relays

A new addition to the range of relays made by Measuring Instruments (Pullin) Ltd., Electrin Works, Winchester Street, Acton, London, W.3, and one which has been specified for the Bristol Britannia aircraft, is illustrated in the photograph. The new relay, while using basically the same mechanism as the existing one, and being produced in the same ratings, incorporates a much-improved sealing method. The main features of the new type are a Neoprene gasket, a contact block moulded from melamine, so designed that all terminals are on the same level, thus giving maximum shrouding, and a nylon bobbin connector. Melamine is also used for the shorting-bar housing, since it has been proved in practice to be more resistant to wear as well as possessing superior anti-break properties to urea and phenolic materials. The Pullin relays have been thoroughly tested and results have established already that they will withstand forces up to 20g. and vibrations of .003-in. amplitude at 250 to 8,000 cycles per minute frequency. The sealed relay makes a saving of over 30% in weight and 75% in space possible.

Plastic Fire Hose

Exhibited for the first time at the Chief Fire Officers' and Institution of Fire Engineers' Conference at Folkestone was the BTR Plastidry fire hose. The hose consists of an extremely tough plastics inner tube and outer cover enclosing and protecting a strong synthetic fibre reinforcement. The inner tube and outer cover form a homogeneous mass of which the reinforcing agent is an integral part. The exterior of the hose is embossed with a protective finish to prevent damage when the hose is dragged over rough ground. The construction of the hose is such that the bore is very smooth and will in consequence deliver up to 60% more water than canvas hose and 10% more than a rubber-lined hose. Another advantage is that the hose does not require drying after use and can be rolled wet and stored without any deterioration. The Plastidry fire hose is manufactured by British Tyre and Rubber Co., Ltd., Herga House, Vincent Square, London, S.W.1.



Plastic fire hose.

Burette Tap

Specially designed for the accurate control of flow and for ease in operation the new burette tap shown in the photograph was exhibited by Townson and Mercer, Ltd., of Croydon, at the British Instrument Industries Exhibition. The four parts from which it is constructed are fabricated in polythene, and control is effected by means of a knurled screw which closes both the inlet and outlet and also controls the rate of flow. The tap is also fabricated from polytetrafluoroethylene.

(Left) Burette tap fabricated in polythene.

Flow Carbon Filters

From America comes news of a new design, and in consequence one which will reduce cost, of porous Teflon (p.t.f.e.) and Kel-F (monochlorotrifluoroethylene) in-line filters. The new filters are of an all-welded construction which hitherto has been impracticable and have been designed with moulded flow passages. One of the features of these filter assemblies is the ease with which they can be taken apart for cleaning. Great compactness has been achieved with a square foot of filter area contained in a volume 2 in. high by 3½ in. outside diameter. The filters are manufactured by Porous Plastic Filter Co., Glen Cove, New York.

Refractor Light Bowl

The new refractor bowl produced by G.E.C., to be known as the Z6708 Plastifractor, is injection moulded in Diakon acrylic moulding powder. The bowl has a non-axial, asymmetric distribution ideally suited to side-street lighting. This method of manufacture has many advantages, including repetitional accuracy, high finish on the prisms, good impact resistance and light weight. The non-axial distribution is obtained by vertical prisms on the outside of the bowl and horizontal prisms on the inside. The bowl is being shown for the first time at the Association of Public Lighting Engineers' Conference together with an injection-moulded sodium lantern bowl.

(Right) Refractor light bowl injection moulded in Diakon.

Garden swing covered in printed p.v.c., manufactured by Storey Brothers Ltd.

Glass fibre bonded with polyester resin has been used to mould the hull.

Garden Furniture

One of the most attractive exhibits at the British Plastics Exhibition in June was a garden swing covered with beautifully printed p.v.c. sheet, manufactured by Storey Brothers Ltd., of Lancaster. One of the great advantages of this application of the material is its inherent resistance to bad-weather conditions and wear and tear in active use.

Purified-water Dispenser

Holts Products Ltd., 56 Ingle Street, London, W.C.1, are marketing a purified-water dispenser in two sizes, 6 or 16 oz., the bottle of which is produced in polythene by Cascelloid Ltd., Abbey Lane, Leicester. A feature of the unit is that ion-exchange resins are incorporated, so that from 1-20 gallons of high-quality de-mineralized water, according to the hardness of water to be treated, can be produced.

Reinforced Plastics Boat Hull

The 26-ft. cruiser "Teresa," illustrated above, was built by the Itchenor Shipyard at Itchenor, Sussex. Glass fibre, bonded with polyester resin, was used in the fabrication of the hull and, as can be seen, has given a very effective result.

Manufacture of the hull itself was by Halmatic Ltd., mahogany and plywood being used for the interior trim and lining. Itchenor Shipyard Ltd. estimate that a duplicate of "Teresa," fitted out in the same way, would cost about £2,000 at the present time.

Pedal Bin

Fraser and Glass Ltd., North Finchley, London, N.12, have produced a new waste bin in which lid and base are moulded in the new high-impact-moulding powder Bextrene B.C.15, manufactured by B.X. Plastics Ltd. The bucket proper is injection moulded in polythene and the treadle mechanism is made in metal with a polythene foot cushion.

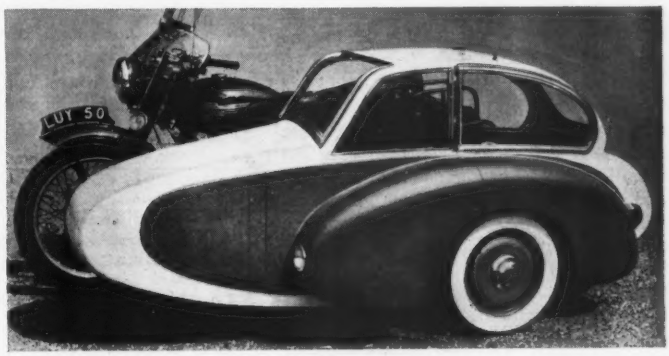
The styrene B.C.15 was selected because of its strength and excellent finish, and the complete unit, in red and green, is being marketed under the trade name Fethaware.

Polyester-glass Sidecar

Since the first announcement in *Plastics* (June, 1955), considerable development work has been carried out by Plastic Motor Bodies Ltd., 69 Weston Road, Crystal Palace, London, S.E.19, in the manufacture of glass fibre/polyester sidecars. A prototype, photographed below, has recently been in the hands of our associate journal *Motor Cycling* for extensive tests, and the results have been extremely satisfactory. *Motor Cycling* reports that the strength of the moulded unit is such that it is a safe sidecar in which to ride and would be cheap to repair in the event of accidental damage. Our photograph shows a spray-painted finish, but later production units will embody self-colouring as a standard procedure.

Polythene waste bin. High-impact polystyrene is used for the lid and base. The bucket is in polythene.

(Left) Purified-water dispenser. Bottle in polythene.



Glass fibre has made possible this stylish motorcycle sidecar.

Plastics NEWS

Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes

LABORATORY HOMOGENIZER.—This Minisonic machine uses the "Rapisonic" principle of emulsification and homogenization by ultrasonic cavitation and has been designed to make possible the transfer of a product from the laboratory stage straight into full-scale production without altering the manufacturing technique because of the similar vibrating element used. It can also be used for the making of emulsions by ultrasonic means in small batches.

The "Minisonic" is so constructed that it represents a completely self-contained unit. No pre-mix vessels or ancillary plant are required. Emulsions can be prepared to any given formula in batches of up to one gallon. The continuous phase in the primary funnel can be recirculated via the vibrating element using the flexible hose, and the disperse phase can be introduced through the inner funnel at regulated speed.

Ultrasonic Homogenizer for laboratory work.

The finished product can be discharged, again using the flexible hose. Pre-mixed emulsions are processed by using the primary funnel without the inner one.

All parts in contact with the liquid are fabricated in 18/8 quality stainless steel or corrosion-resistant alloys, so that absolute cleanliness in operation is assured. The vibrating element can be quickly dismantled and adjustment is very simple. The removable resonant bell is complete with tailpiece and a length of thick-walled p.v.c. hose. The high-speed precision gear pump is designed to combine efficiency with long life. On its suction side, the funnel unit is mounted while the vibrating element is integral with the delivery. The prime mover is a ½ h.p. squirrel-cage and screen-protected motor directly coupled to the pump and mounted on a Warerite baseboard.

NEW MOISTURE METER.—A new meter covering moisture ranges from 0.5% to upwards of 60%, which takes a sample of the material to be tested large enough to provide an overall average reading really representative of the bulk, has been designed by Toplis, Simpson and Co., Ltd., Sunleigh Works, Sunleigh Road, Wembley, Middlesex.

The Kappa meter operates at a high radio frequency and employs frequency-sensitive circuits to detect and measure a change of capacity. This change occurs in the condenser, which is, in fact, the sample container, and the measurement actually made—and indicated on a direct-reading scale in terms of moisture content—is a function of the increase of capacity of this condenser caused by the introduction of the sample.

The Kappa circuit operates at 10 Mc/s. Its pointer movement—over a linear scale that can be coupled, in turn, to each of six moisture ranges—is as nearly proportional to moisture content as it is possible to make it, and it employs a frequency-sensitive circuit that detects a change of frequency of 2 in 10,000; accuracy of this order is necessary when samples of low moisture content are tested. Operation is simple; the sample is introduced and capacity then removed from a part of the circuit by operation of the range-buttons and pointer control until the effect of the capacity introduced is exactly neutralized, as indicated by a visible signal (a neon lamp). Fifty times as much capacity as that introduced by samples of very low moisture content is removed by these robust components, this 50 : 1 magnification falling gradually to about 12 : 1 in the highest moisture range.

The Kappa is light in weight, is easily transported and consumes only 40 watts from the standard 230v. A.C. supply. Other voltages are allowed for and battery operation is possible. Voltage stabilization is not necessary.

PRODUCTION OF WATER COOLERS.—Heenan and Froude Ltd., of Worcester, manufacturers of water coolers since 1909, and the Marley Company of Kansas, who produce evaporative water coolers, have entered into an agreement for the production of Heenan-Marley water coolers. Under this agreement the British company, as exclusive licensees, will manufacture coolers for practically all countries outside North and South America. They will be of Marley design with slight modifications for British requirements.

CHANGE OF EDITORIAL ADDRESS.—As from the publication of this issue the editorial address of *Plastics* is Bowling Green Lane, London, E.C.1, telephone No. Terminus 3636. All correspondence should be sent to this address.

CORRECTION.—The August issue of *Plastics* referred (on page 264) to the production of styrene emulsion paints, stating that Vinyl Products Ltd. manufactured 20,000 tons in 1954. It should be made clear that this figure of 20,000 tons refers to the estimated total manufactured in 1954 for the whole of the country, for washable paints; Vinyl Products are one of the major producers of these emulsions.

NEW ITALIAN RESIN PLANT.—The Export-Import Bank of Washington has just authorized a credit of $2,070,000 in favour of the Montecatini group of Milan, to be used in developing a resin plant to be erected near Milan at a cost equivalent to over $8,000,000. The credit by the bank will be used for the purchase of special U.S. machinery and equipment for the production and processing of resin and resin products, including plastics, paints and varnishes. This credit represents an allocation out of the overall credit of $20,000,000 the Export-Import Bank granted this spring to the Instituto Mobiliare Italiano in order to expand industrial output and alleviate unemployment. The loan to Montecatini is for ten years, including a two-year waiting period to allow for the construction and initial trial operation of the plant. The rate of interest is 4¼% per annum.

FIRST EPICHLORHYDRIN PLANT IN EUROPE.—In order to cater for the increasing demand for epoxide resins, marketed by Shell under the name "Epikote," a new plant is now being built by Shell at Pernis, near Rotterdam, to manufacture epichlorhydrin, one of the two key ingredients of these new chemicals, from petroleum. Production is expected to begin in September, 1956. The other important ingredient of "Epikote" resins, di-phenylol propane, is already manufactured at the Stanlow chemical plant in Cheshire.

At present epichlorhydrin is available only from the U.S.A. For its manufacture in Holland, use will be made of the technique known as "hot chlorination," the subject of special study by the Shell Development Company in California and one of the processes for which this company received the 1948 award for chemical engineering achievement made by the publication *Chemical Engineering*. The new plant will have at its disposal experience gained during some seven years of commercial production in the U.S.A.

UNION CARBIDE ATOMIC ENERGY.—The formation of Union Carbide Nuclear Company, a division of Union Carbide and Carbon Corporation, which has been formed to integrate the corporation's diverse activities in the atomic energy field, was announced by Morse G. Dial, Union Carbide's president. Mr. Dial stated that an important objective of the new company

will be to carry on large-scale research and development activities leading to increasingly important participation by the corporation in the industrial applications of atomic energy.

EMULSIFIER.—Croda Ltd., Croda Works, Snaith, Goole, Yorkshire, announce the production of Polamine, a new anionic type of emulsifier. Polamine is a powerful emulsifier of the oil-in-water type, producing stable emulsions of very fine particle size. It is specially recommended for the preparation of emulsions of mineral oils, vegetable oils and solvents.

BUSINESS TAKE-OVER.—Simms Motor Units have acquired the issued capital of Clearex Products, Ltd., manufacturers of three-dimensional badges and other articles from acrylic sheet material.

ANTARCTICA TEST.—Mr. Duncan Carse, the explorer, who is leading an Antarctic survey expedition, is co-operating with the technical staff of Shell Chemicals Ltd. in testing spar varnish based on "Epikote" resin under extreme conditions. The varnish is to be used as the protective coating for the ash-framed Nansen-type sledges.

NEW AGENCY TAKEN UP BY B.X. PLASTICS LTD.—The agency for Great Britain and Eire of Polyflex extruded polystyrene film and sheet, manufactured by the Plax Corporation of Hertford, Connecticut, U.S.A., has been taken up by B.X. Plastics Ltd.

PURCHASING OFFICERS CONFERENCE.—Programme for the national conference, to be held at Cliftonville from September 29 to October 1, is available from the secretary, Purchasing Officers Association, Wardrobe Court, 146a Queen Victoria Street, London, E.C.4.

SILICONES EXHIBITION.—An exhibition on the history, production and application of silicones is to be held in Leeds in the Large Hall, Leeds Church Institute, 5 Albion Place, from Monday, September 26, to Friday, September 30. The exhibition, entitled "Silicones for Industry," will be open each day from 10 a.m. until 6 p.m., with the exception of Monday (opens 2.30 p.m.). Invitations to the exhibition can be obtained on request from Midland Silicones Ltd., 19 Upper Brook Street, London, W.1.

Mr. H. R. Glendenning, Midland area sales manager (moulding powders), B.I.P. Chemicals Ltd.

NATIONAL CONFERENCE. — The British Institute of Management announces that its National Conference, the tenth to be held since its inauguration, will this year be at Harrogate from November 2 to 4. Speakers who have already accepted invitations to address the conference include John Diebold, American pioneer of the application of "automation," Sir Geoffrey Vickers, V.C., and Sir Charles Goodeve, O.B.E., F.R.S., director of the British Iron and Steel Research Association.

ELECTRICAL ENGINEERS' EXHIBITION, 1956.—Final arrangements are now being made for the next Electrical Engineers' Exhibition (sponsored by the Association of Supervising Electrical Engineers), which will again be held at Earls Court. Opening daily from March 20 to 24, 1956, from 10 a.m. to 7 p.m. excepting Wednesday, March 21, when the hour for closing will be 9 p.m.

OIL AND COLOUR CHEMISTS' ASSOCIATION 1956 EXHIBITION.—The eighth technical exhibition will be held in the Royal Horticultural Society's New Hall. The exhibition will take place on March 20, 21, and 22, 1956, when it is expected an increased number of visitors will be attending.

Companies who have not previously exhibited and who would like to have their names submitted to the committee for consideration should write to the General Secretary, Mr. R. H. Hamblin, Oil and Colour Chemists' Association, Memorial Hall, Farringdon Street, London, E.C.4.

FUEL EFFICIENCY COURSE.—A residential refresher course for works and plant engineers is to be held under the auspices of the National Industrial Fuel Efficiency Service with the support of the Southern Regional Council for Further Education from September 26 to 30 at the Clarendon Laboratory, Oxford. There will be 15 sessions given by lecturers eminent in the field of fuel technology. A works visit is also included. A copy of the preliminary programme and registration form and any further information about the course can be obtained from the Course Secretary, Mr. E. S. Watkin, Ailsa House, 181 Kings Road, Reading, Berks.

TRAVELLING SCHOLARSHIP.—British Insulated Callender's Cables, Ltd., have instituted a Travelling Scholarship as a tribute to Sir Alexander Roger, K.C.I.E., for many years chairman of the company and now its first honorary president. It will be known as the Sir Alexander Roger Travelling Scholarship.

With a value up to £1,000 in addition to normal emoluments, it will be awarded annually to an employee of B.I.C.C. or of one of the various companies of the B.I.C.C. Group and will enable a young man or woman of ability to travel overseas for study, training and general education for a period of not more than 12 months.

JUNIOR LECTURE.—The first of what is hoped will be a regular series of lectures will take place on October 4, at 6.30 p.m., at the Burroughs Wellcome Institute, Euston Road, London, N.W.1. Given by Mr. K. R. Lawrence, A.R.I.C., the paper will deal with the position of a large moulding organization in relation to industry in general. Moulding techniques, both compression and injection, will be discussed from a practical point of view, in relation to economic conditions. The lecture will also include information on vacuum forming, extrusion and reinforced plastics.

Entitled "Moulding Methods Today," the paper has been specially designed for junior members of the Institute and all to whom a general survey of this subject will be of interest. The object is to provide essential information not normally imparted through the specialist lectures delivered at the regular meetings of the London Section of the Institute. Those studying for the Diploma and Associateship examinations of the Institute will find this lecture of particular importance. The chair will be taken by Mr. H. P. Bridge, managing director of British Moulded Plastics Ltd.

SYMPOSIUM ON MACROMOLECULAR CHEMISTRY.—An International Symposium on Macromolecular Chemistry is to be held in Israel from April 3 to April 9, 1956. The topics will be General Behaviour of Polymers in Solution; General Behaviour of Biocolloids and Polyelectrolytes in Aqueous Solution; Special Polymeric Systems in Solution.

Further details can be obtained from The Weizmann Institute of Science, Rehovot, Israel.

E.R.A. PUBLICATIONS.—Just released for publication by The Electrical Research Association, Thorncroft Manor, Dorking Road, Leatherhead, Surrey, is a paper L/T290 entitled The Variation with Temperature of the Electrical Strength of Polyisobutylene Subjected to Discharges. Copies can be obtained from the Association, price 10s. 6d., postage 3d.

MR. THOMAS G. ELLISON has been elected chairman of the directors of George Ellison Ltd., Tufnol Ltd., and Alfred Ellison Ltd. He succeeds his father, the late Mr. George Ellison, whose death occurred recently.

The late Mr. George Ellison.

"AIR POLLUTION PROBLEMS AND THEIR CURE."—This is the subject of a paper to be given to the London Branch of Incorporated Plant Engineers at the Royal Society of Arts on Tuesday, October 4, at 7 p.m. The author is Mr. J. B. M. Mason, F.Inst.F., M.I.Plant E., technical director of Judd Budd Ltd., and formerly chief fuel engineer, Ministry of Fuel and Power. The guest chairman will be the Rt. Hon. Alfred Robens, M.P.

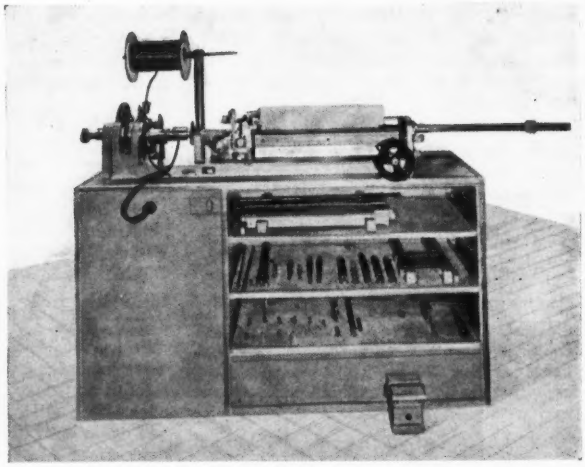
UNPUBLISHED REPORTS.—A New Process for Producing Electrotypes: No. IR 13,777. The most recent innovation is the use of plastic moulds. Sheets of a copolymer of vinyl acetate and vinyl chroride (vinylite) have so far given best results; efforts are also being made to employ plastics with a lower expansion coefficient than vinylite. In plating an important introduction is the use of silvering in place of graphite to render non-metallic surfaces conducting.

Procedure for the Estimation of Meta and Paracresols: No. PB. 109,262. A new technique is presented for the accurate analysis of meta-cresol-para-cresol mixtures by freezing-point data. This method should lend itself to the control of the composition of cresols for antiseptics, or raw material for plasticizers, for cable insulating stocks or synthetics. It has already proved of value in the exploration of new sources of phenol and cresols.

Microwave Electrical Characteristics of Radome Materials at 8.5 Kilomegacycles per Second: No. PB. 111,526. Characteristics of commonly used radome materials and of materials under development are presented in a table which gives values for dielectric constant at 8.5 K mc/s X loss tangent for two standard test conditions. The test equipment used, comprising a modified microwave dielectrometer, is described briefly. Measurements can be made in the temperature range $-10°$ C. to $+250°$ C.

Room Temperature Curing Metal-to-metal Adhesives: No. PB. 108,755. The best adhesives so far developed have been based on ethylenic-type polymers or epoxy resins. Formulation and strength values for these are presented.

Final Report on the Thiokol Polymerization Reaction: No. PB. 109,639. There are two principal variables in the Thiokol polymerization reaction which can be changed in an attempt to produce improved polymers. The rank of the polysulphide can be varied and any of a variety of oliphatic groups may be used. Another variation is to make copolymers using two or more different dihalides. In the investigation reported all available dihalides were studied. Some of these were not available commercially and had to be prepared in the laboratory. These latter are discussed in detail. The report then presents studies of analytical procedures, polymerization methods, compounding, some experimental polymers and information on testing methods and combination of Thiokol-type polymers with other polymer types. Tables showing curatives for various compounds and the resulting physical and mechanical properties, block studies, the effect of sulphur, heat ageing and associated subjects are given.



A Dutch spiral binding machine shown by Thomas E. Knight and Co. at the IPEX exhibition. This machine uses both wire and plastics monofilament for the binding.

Preparation and Casting of Sheets of Polymethyl Alpha-chloroacrylate: No. PB. 108,764. The sheets were prepared for evolution as sheet material for the glazing of supersonic aircrafts. They were cast in $\frac{1}{8}$-in. and $\frac{1}{4}$-in. thicknesses and possessed heat-distortion temperatures above 250° F. A description of all the processes involved in their preparation is given.

Development of Sizings for Glass Fabric in Polyester Resin Laminates: No. TIDU 2383. A previous report (AFTR 6220) described the development of a glass fabric sizing consisting of vinyl trichlorosilane in conjunction with beta-chloro-alkyl alcohol. The present report describes an investigation of various other sizing compounds, the development of a small pilot-plant scale process and discusses the effect of process variables. An appendix gives a comparison of liquid phase sizing treatments, a comparison of liquid phase sizing treatment with various silane diluents, data for laminates prepared by batch, liquid and vapour phase processes, information on drying after silane treatment, on rinsing for liquid phase vinyl trichlorosilane sizing and data on laminates treated with vinyl-trichlorosilane sizing.

Physical Properties of Irradiated Plastics: No. AEC ORNL 928. Graphs and tables are presented depicting quantitatively the changes in physical properties which various plastics undergo when exposed to radiation. The properties investigated include tensile, shear and impact strengths; Rockwell hardness; changes in weight; specific gravity; water absorption; light transmission; volume resistivity; dielectric strength and arc resistance. Certain mineral-filled phenolics and styrene polymers withstood a dosage of 10^{19} n.v.t. with little change in any properties. Cellulose casein, acrylic and chlorofluoroethylene plastics decrease in tensile strength with a dosage of 10^{17} n.v.t. The nature of the 33 plastics investigated is specified and a discussion is included on the theory of the effect of ionization on materials. Test procedures are described.

Copies can be obtained from Department of Scientific and Industrial Research, Technical Information and Documents Unit, 15 Regent Street, London, S.W.1.

GOVERNMENT PUBLICATION.—Ministry of Defence. General requirements for packaging supplies for the Services, Part II, section 4, Employment of flexible waterproof and water-vapourproof materials in packing construction, price 1s. 6d. plus postage 1½d., obtainable from H.M. Stationery Office, York House, Kingsway, London, W.C.2.

BRITISH STANDARD FOR GLYCERINE (GLYCEROL).—British Standards for five grades of glycerine have recently been issued in one volume, B.S. 2621-5:1955, by the British Standards Institution. They are: B.S. 2621—Soap lye crude glycerine; B.S. 2622—Saponification (hydrolyser) crude glycerine; B.S. 2623—Pale straw glycerine; B.S. 2624—Dynamite glycerine; B.S. 2625—Chemically pure glycerine (glycerin). Specification requirements are given in respect of each grade, together with methods of sampling and of analysis of the materials. Some further methods of test, additional to those required for determining compliance with the British Standard, are also given in an appendix.

GERMAN PUBLICATION.—Answers to "Individual Questions" on matters pertaining to chemical apparatus and equipment (eighth series) appear in a number of the "Dechema-Erfahrungsaustausch," which has just appeared. The following topics are dealt with in this number: Bench and wall coverings for laboratories, non-destructive testing of materials of construction, resistance of nitrided steels to chemical action, static loading of p.v.c. powder, dimensions of vapour compressors, removal of scale in evaporators, synthetic filter cloths, material for construction of containers for ammonium phosphate solutions, testing for imperviousness of ampoules, lining materials for rock salt storage bunkers.

Copies of this number can be obtained from the Dechema, Frankfurt a. M. W.13, Postfach, price DM.12.80, packing and postage DM.0.50.

PRODUCTIVITY PAMPHLET.—The latest pamphlet produced by the British Productivity Council, Standardization—An Aid to Productivity, is now available and copies can be obtained from them at 21 Tothill Street, London, S.W.1, price 9d.

BRITISH CHEMICALS AND THEIR MANUFACTURERS.—The 1955 edition of this very useful book published by the Association of British Chemical Manufacturers contains some twelve thousand products named systematically in accordance with B.S. 2474 : 1954. A list of proprietary names is also given with drawings of trade and house marks. Copies are available free of charge to persons or firms genuinely interested in the purchase of chemicals. Inquiries should be addressed to the Association at Cecil Chambers, 86 Strand, London, W.C.2.

FELLOWSHIP.—Mr. Baum, the managing director of Lacrinoid Products Ltd., was elected a Fellow of the Plastics Institute on July 12.

MR. G. DODD.—Mr. Gilbert Dodd, general manager of Monsanto Plastics Ltd., has been appointed to the board of directors of that company.

MR. W. PAYNTER.—Mr. William Paynter, formerly production manager of the special products division of E. K. Cole Ltd., has joined Mervyn Instruments of Woking as works manager.

DR. THOMAS GIRTIN.—Dr. Thomas Girtin recently retired from the chairmanship of Johnson and Sons Smelting Works Ltd.

MINISTRY OF SUPPLY APPOINTMENT.—The Ministry of Supply announce that Dr. E. A. Perren has been appointed chief superintendent, Chemical Defence Experimental Establishment, Porton, in succession to Mr. S. A. Mumford.

COUNCIL OF INDUSTRIAL DESIGN.—The Board of Trade announce that the President has appointed Mr. F. Shepard Johnson, J.P., to be a member of the Council of Industrial Design, to take the place of Mr. A. E. Hewitt, C.B.E., M.C., J.P., F.R.S.A., F.R.Hort.S., who has resigned.

MANCHESTER OIL REFINERY (HOLDINGS) LTD.—Dr. G. Tugenhadt has been appointed deputy chairman of Manchester Oil Refinery (Holdings) Ltd.

CHANGES OF ADDRESS.—The registered office of the Mond Nickel Co., Ltd., is now Thames House, Millbank, London, S.W.1.

Arlington Plastics Development Ltd. have moved to Arlinghide Works, Eastern Industrial Estate, Harlow, Essex. Telephone number is Harlow 24611/2/3/4.

Extruded packs by Thos. De La Rue and Co., Ltd.

Francis Shaw and Co., Ltd., announce that their London office is now situated at Terminal House, Grosvenor Gardens, London, S.W.1. Telephone number Sloane 0675/6.

Dunlop Special Products Ltd., Compositions and Flexible Plastics Division, has moved to Empire Way, Wembley, Middlesex. Telephone number Wembley 9441/4.

The address of the Council of Industrial Design is now 28 Haymarket, London, S.W.1. Telephone number Trafalgar 8000.

S. M. Alexander and Co. have moved into larger premises at Bridge Works, Wallace Road, Canonbury, London, N.1. Telephone number Canonbury 6441.

CHANGES OF TELEPHONE NUMBERS.—The telephone number of the accounts and sales department of Sunvic Controls Ltd., Eastern Industrial Estate, Harlow, is now Harlow 25271. The London sales office telephone number of British Insulated Callender's Cables Ltd. is Terminus 2701. Metal Industries Ltd. announce that the number Sloane 5587 has been superseded by the numbers Sloane 7192, 7193, 7194; Sloane 5814 and 5618 remain in service. The Solartron Electronic Group Ltd. have a new telephone number, Emberbrook 5522.

Plastics in the Service of Man

The following is a list of full names and addresses of companies mentioned in the illustrated feature, "Plastics in the Service of Man," which appears on pages 306 to 307 in this issue:—

59. Plastics on Holiday—II

A. P. Welding Co., 546 Harrow Rd., London W.9.
Aero Pipe and Glass Co., Ltd., Bay House, Harlesden Road, London, N.W.10.
B.X. Plastics, Ltd., Higham Station Avenue, London, E.4.
Bakelite, Ltd., 12-18 Grosvenor Gardens, London, S.W.1.
Beetle—British Industrial Plastics, Ltd., 1 Argyll Street, London, W.1.
Bexoid—B.X. Plastics, Ltd.
Cascelloid, Ltd., Abbey Lane, Leicester.
Coronet—Dufay, Ltd., 14 Cockspur Street, London, S.W.1.
Elliot, E., Ltd., 315 Summer Lane, Birmingham, 19.
Flexigrip, Ltd., 49 London Wall, London, E.C.2.
Hayling Yacht Co., Ltd., Hayling Island, Hampshire.
Jameson, W. and Co., Abbey Works, Chelmsford, Essex.
Kenure, J. F., Ltd., Faggs Road, Feltham, Middlesex.
Marconiphone Co., Ltd., Hayes, Middlesex.
Moulded Products, Ltd., Walthamstow Avenue, London, E.4.
Robinson, E. S. and A., Ltd., 1 Redcliff Street, Bristol, 1.
Shawcraft Models, Bathurst Walk, Iver, Bucks.
Streetly Manufacturing Co., Ltd., Streetly Works, Sutton Coldfield.
Taylor, Thomas, Glasgow.
Tygan—Fothergill and Harvey, Ltd., Harvester House, 37 Peter Street, Manchester, 2.
Universal Metal Products, Ltd., Langley Road, Pendleton, Salford, 6, Lancs.
Velbex—B.X. Plastics, Ltd.
Wood and Kotek, Ltd., 56-8 Turnham Green Terrace, Chiswick, London, W.4.

MEETINGS

September

13th.—Works Visit. Spillers Mills, Cardiff. Plastics Institute, South Wales and Monmouthshire Section. 3 p.m.

14th.—"The Role of the Industrial Designer," R. E. Brookes. Plastics Institute, Yorkshire Section, St. Mark's House, 186 Woodhouse Lane, Leeds. 7.15 p.m.

14th.—Social Evening. Plastics Institute, Western Section, Cowley Manor, Nr. Cheltenham. 7.30 p.m.

16th.—Ladies' Evening—"Next Week's Washing" or "The Uses of Man-made Fibres for Clothes and Household Textiles," H. A. Thomas, B.Sc., Ph.D., F.R.I.C., F.T.I.F.S.D.C. Plastics Institute, Midlands section, The James Watt Memorial Institute, Birmingham.

21st.—Works Visit. Stewarts and Lloyds, Ltd., Corby Works, Northants. Plastics Institute, Midlands Section.

27th.—"Polymers Containing Flourine," Dr. J. Gadsby. Society of Chemical Industry, Plastics and Polymer Group. The Birmingham and Midland Institute, Birmingham. Joint Meeting with Birmingham and Midland Section, S.C.I. 6.30 p.m.

28th.—"Plastics and Local Industry," representatives of local firms. Plastics Institute, Western Section, Erinoid Clubhouse, Lightpill, Stroud. 6.30 p.m.

29th.—"Raw Material Supply for the Future," T. C. Corbett, Chairman of London Section, Plastics Institute. Wellcome Research Institution, 183 Euston Road, London, N.W.1. 6.30 p.m.

October

4th.—"Moulding Processes Today," junior lecture, K. R. Lawrence, A.R.I.C. Plastics Institute, London Section, Wellcome Research Institution, 183 Euston Road, London, N.W.1. 6.30 p.m.

4th.—"Talks on Synthetic Fibres and Plastics in the Toy Industry." Ladies' Evening, Plastics Institute, Midlands Section, Bell Hotel, Leicester. 6.45 p.m.

6th.—"Some New Developments of Reinforced Plastics in the Chemical Industry," Dr. F. F. Jaray. Plastics Institute, Southern Section, The Chemistry Department, The University, Southampton.

7th.—Works Visit. Manchester Ship Canal, Offices and Tour of Docks. Plastics Institute, North-Western Section 2 p.m.

11th.—"Some Dynamic Properties of Polymers," H. Warburton Hall; "The Measurement of the Flow Properties of Plastics at High Stresses," R. Hayes and D. A. Lannon; "Some Frictional Properties of Plastics," Dr. Anita Bailey. Society of Chemical Industry, Plastics and Polymer Group, Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1. 6.30 p.m.

12th.—"The Significance of Plastics to Local Governments and Public Authorities," discussion on each branch of plastics to be opened by a local member. Plastics Institute, South Wales and Monmouthshire Section, Grand Hotel, Cardiff. 7 p.m.

TALKING SHOP . . .

Irradiated Plastics. A report in the *Walsall Observer* for August 12 indicates that Walsall may be chosen as the site of a research station by Tube Investments Ltd., for experiments in the industrial uses of plastic materials which have been exposed to rays from an atomic pile. Among Midland sites under consideration by the company is a six-acre site at the former Walsall airport.

* * *

Polyester Resin Production in America. *Chemical and Engineering News* for August 8 published figures on the production of polyester resins in 1954. These were contained in the Tariff Commission's report on the plastics and resins industry. Approximately 22,000 tons of polyester resins were manufactured, of which 16,000 tons were directed into the reinforced-plastics industry. I estimate this latter figure to be roughly 16 times greater than the usage in Great Britain.

* * *

Plastics Industry Education Appeal Fund. Criticism has been offered of the fact that students at the Borough Polytechnic holding bursaries from the industry's Appeal Fund were placed in jobs before contributors to the Fund were aware that they had completed their courses. It is, of course, frustrating to realise that only a very small number of companies contribute to the Education Fund and that despite this a number of the students who have been trained on grants from the Fund can easily find their way into companies which have given the Fund no support at all. I think, however, that this is a situation that is unavoidable at a time like this when there are obviously neither enough students to go round the whole industry, nor adequate support from the whole industry for the scheme itself. We shall certainly try, by publicizing the success of these courses year by year, to incorporate more companies to donate to this very worthy cause. At the moment the gross income to the Fund is some £7,000 a year, totally inadequate for a really comprehensve training scheme that can supply to the industry the very large number of trained technical staff required.

* * *

The Future of Polyesters. *The Times Review of Industry* for August included an article summarizing progress in the polyester resin field with special reference to reinforced plastics. A small point of interest was the reference to the Chevrolet plant, where it is understood the moulded Corvette body is proving expensive and where difficulties are found in maintaining the scheduled output of 5,000 cars per month. In Great Britain little progress appears to have been made towards any significant usage of glass fibre and polyester resins for this purpose. We know of no motor manufacturer at the moment who is using these materials in any quantity.

* * *

Good Idea. United Ebonite and Lorival, Ltd., recently opened their works to the public when 3,000 relatives and friends toured the plant. Four hundred of the 1,200 employees were on duty voluntarily, to act as guides and to provide working demonstrations. *The Bolton Evening News* reported the event, which was highly successful and the second so far arranged. An idea here for other companies to promote good relations and to sell the idea of plastics, too.

* * *

Flexible Plastics Help to Break Record.— As is now well known, Donald Campbell established a new World's Water Speed Record of 202 m.p.h. on Lake Ullswater on July 23. No small part in the success which crowned his long campaign to achieve this record was played by components made from new flexible synthetics, and Mr. P. D. Patterson, of the Dunlop Research Centre, has sent me the following notes.

"To those who watched the various runs on Lake Ullswater and to the wider audience who saw the proceedings on television, the giant marker buoys were the most obvious special equipment. These products presented special problems in design and construction.

"At such high speeds over inland water, it was naturally of first importance to keep on course, to know the turning points and to be certain when the measured kilometre was entered. A comparatively small deviation from the pre-determined course might easily bring about disaster by hitting shallow water and piling up on an underwater obstacle, or even on adjacent islands, or the mainland itself. The water itself could not, of course, be permanently marked, as could a track on land, so that it was necessary to construct special marker buoys.

"The requirements for these buoys were that they should be easily visible a long way off and be capable of being moored in position without any possibility of drift due to the conditions of wind or water on Lake Ullswater.

"A further requirement was that in the event of accidental collision with the boat the buoys should offer as little resistance to impact as possible, so as to minimize the risk of damage to the hull. These needs were met by a new type of buoy, several of which were designed and constructed by the General Development Division of the Dunlop Research Centre from material supplied by the Dunlop Special Products Company. They were made in two sizes and their general appearance can be seen in the photograph.

"In brief, the larger buoys consisted of an inflated globe, 9 ft. 6 in. in diameter, made from 14 thou. thick 'Duvinal' laminated plastic sheeting (polyvinyl chloride) in the bright colour 'traffic yellow.' To ensure the necessary stability, these globes were mounted on 10 ft. 6 in. diameter stabilizing rings made of the same material. The smaller buoys were of similar design, but 3 ft. in diameter and 4 ft. high when mounted on the stabilizing rings. The larger units only weighed 18 lb. and the smaller 11 lb. The course, as well as the obstacles to be avoided, was marked with six large and eight smaller buoys.

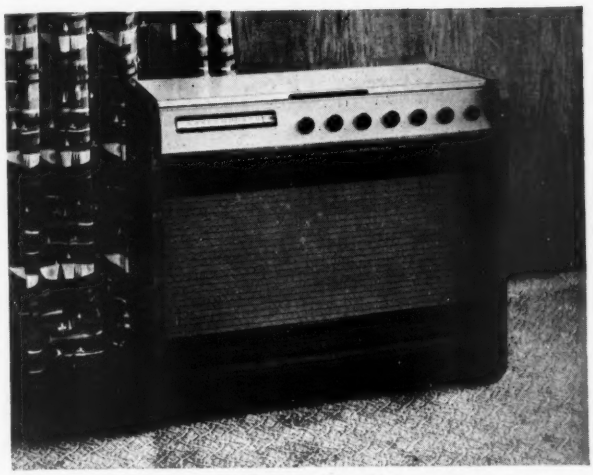
"Preliminary work on Midland waters showed that the problem of anchoring the buoys would not be an easy one to solve. For instance, it was found that in a 15 m.p.h. wind on land it took four men to hold the larger buoys down and that any smaller number ran a grave risk of becoming airborne. On water, this problem was solved by securing each buoy with three Admiralty pattern 30-lb. anchors, attached to a suitable harness so that they were spaced 120° apart. On Ullswater these anchors were operating at an average depth of 180 ft., one operating at 240 ft. In the preliminary tests in the Midlands the buoys behaved satisfactorily in a 54-knot wind which generated waves 2 ft. 6 in. high; conditions at Ullswater were less severe."

PLASTIKON.

Marker buoys on test on a lake in the Midlands.

The Radio Show, 1955

Some highlights of the use of plastics in radio and television



(Left) Ekco radiogram, incorporating a tape recorder, the cabinet of which is in Warerite. The control panel is in the same material.

THE use of plastics materials by the radio industry has made further progress since 1954; visitors to this year's show could not fail to be impressed by the steadily increasing contribution of plastics to the manufacture of cabinets, frets, knobs and switches, and radiogram accessories.

Attracting most attention was the radiogram shown by E. K. Cole, Ltd., the cabinet of which is entirely constructed of Warerite. Apart from the use of a wood effect laminate for the main structure, Warerite has also been used in attractive pastel colours on the control panel. Resistant to scratches, and cigarette burns, this material is eminently suitable for the job; a further advantage lies in the fact that the cabinet can be exported in a "knocked-down" condition, saving approximately two-thirds shipping space per radiogram.

Moulded cabinets showed many improvements over recent years. The designs are steadily making more use of the inherent advantages of the moulding process. Worthy of special praise were the Ultra "Minstrel" and the H.M.V. Model 1125, although practically every stand had its quota of moulded cabinets. There seemed to be a renewed interest in the small cheap portable set, probably as an adjunct to television, and here mouldings in thermoplastic and thermosetting materials are able to be of special service.

Tygan was used to great effect in frets, with some very effective colour contrasts.

To date, plastics have been hardly used at all in the manufacture of cabinets for television sets. This year was notable therefore because of the Ekco and Murphy portable T.V. sets. Operating on the mains or battery, the Ekco set has a 9-in. tube with a self-contained telescopic aerial. The unit is made that more attractive by a cabinet covering of embossed p.v.c. sheet in two shades and patterns. Again the use of plastic sheet here is not merely decorative; a cabinet thus covered will greatly resist deterioration in appearance, and will be easy to clean.

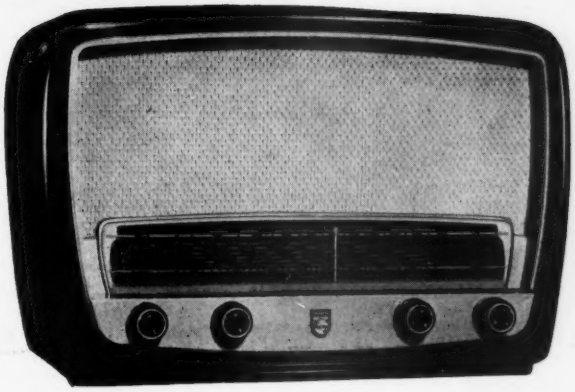
In the case of the Murphy set, also with a 9-in. tube, paper pulp has been bonded with a phenolic resin to give a two-part moulding of great strength and lightness. When moulded the two halves are sprayed with a metallic paint.

De La Rue, Ltd., were represented, prominence being given to a new grade of laminated plastic, Delaron Copper Clad, now being used in the manufacture of printed circuits. Permanoid, Ltd., showed ancillary equipment in the V.O. Grade p.v.c. material. Polythene is also used by the company in the moulding of aerial insulators.

As a final point of interest, compression moulded urea and injection moulded styrene are being used in very large quantities in radiograms and tape recording machines. The generally high standard of design is worthy of special mention.

(Left) Ultra Twin de-Luxe portable, covered with embossed p.v.c. to simulate snake and crocodile skin.

(Right) Ekco portable T.V. set, covered with embossed p.v.c.



(Right) Phillips set, model 341A, with moulded cabinet.

The Properties and Testing of Plastics Materials—Part 2 (Cont.)

Section 6. Hardness.

By A. E. LEVER,* A.I.R.I., and J. RHYS,† M.Sc.

Continuing this series, the authors consider now the factor of hardness. In conformity with previous sections, tabular and bibliographical information is appended.

HARDNESS represents an agglomeration of various properties more or less related to each other. It does not define a single physical property of a material (1) but rather a combination of properties, such as resistance to abrasion, scratching, marring, etc.

There are various categories of behaviour of plastics materials which may be involved in estimating the general property called hardness (2): (a) Indentation under load. (b) Indentation after release of load. (c) Instantaneous return of the energy of indentation. (d) Change of optical properties by abrasive wear. (e) Loss of weight by abrasive wear. (f) Scratch resistance. (g) Mar resistance.

Hardness, defined as resistance to indentation, is not necessarily a measure of mar, scratch or wear resistance (3). For soft plastics the term is now generally restricted to the concept of resistance to indentation.

This has been adopted in the B.S. Hardness test (4) and the American standard (5) (6), which are based on the measurement of the penetration of a rigid ball into the rubber test piece, under specific conditions of loading.

Hardness, as applied to plastics and glass, is discussed (7) and the author suggests the following classifications:—

Fracture Hardness

The surface may be broken because the stresses set up exceed the breaking stresses of the material under the conditions of the test. If the point of loading moves, this point of rupture may become a scratch.

Deformation Hardness

The surface may be merely deformed by the operating forces and: (a) be irreversible; (b) be potentially reversible; or (c) be reversible immediately or in the time allowed in the test.

For certain types of materials having creep and recovery, the time factor involved in application of the major and minor loads has considerable effect on the measurements made (5).

As with many other properties, the temperature of test is important.

Various types of apparatus have been used and tests have been made (2) on some commercial plastics for properties associated with the term hardness.

The hardness value means nothing unless the type of instrument used is stated (8). A table of approximate comparison of hardness scales is given (9).

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While specifically written regarding the testing of vulcanized rubber, Soden (8) deals in a full and comprehensive manner with the description, use, adjustment and calibration of the main types of apparatus used. There are two main types:—

(a) Dead-load non-portable type for accurate and reproducible standards.

(b) Spring-loaded pocket type for routine inspection or control.

With soft rubbers the indentation is closely related to the elastic modulus.

A comprehensive discussion on hardness testing of natural and synthetic rubbers is given (10) which is pertinent to the testing of some plastic materials (see also 52). Correlation between different instruments and between different elastomers is difficult, and comparative figures should be used with caution. Comparison is also made between the Shore Durometer, B.S. and ASTM methods.

The following is a brief description of the various methods used:—

Knoop Hardness Number (11)

The Knoop Indentor has been used for determining the hardness number of non-metallic materials, and the Hardness Number is the ratio of load, in kilograms, to the unrecovered projected area of indentation, in square millimetres. The indentation is measured and the number ascertained from a table supplied with the instrument.

Rockwell Hardness Number (2) (5) (12)

This is an indentation method and various scales are used.

(a) *Alpha Scale* (13), where a $\frac{1}{8}$-in. indentor is used with a 60-kg. load applied for 15 seconds. The resistance to indentation while under load is measured.

(b) *Beta Scale*, which is similar to the Alpha scale but uses a 30-kg. load.

(c) *M. Scale (ACCO)* (14). This uses a $\frac{1}{4}$-in. indentor with a 100-kg. load, the major load being removed 7-8 seconds after tripping the handle, and the hardness reading taken 45 seconds after this.

(d) *M. Scale (PPG1)*, being similar to (c) above but the zero setting is taken 30 seconds after application of the minor load. The major load is applied and removed one second after the crank is stopped, and the hardness reading taken 30 seconds later.

(e) *M. Scale (PPG2)*, is similar to (d) above but the zero setting is at 10 seconds. The hardness reading is taken 45 seconds after the crank has been stopped.

(f) *M. Scale (R and H)*, as with (e) above but the major load is applied and removed after 30 seconds, and the hardness reading taken 30 seconds later.

(g) *R. Scale*, as in (c) above but with a $\frac{1}{2}$-in. indentor and a 60-kg. load.

(h) *L. Scale* (5), is used particularly for nylon.

The penetrator is usually a steel ball, but for very hard metals a conical diamond indentor is used.

Barcol Hardness (2)

This apparatus uses a sharp-pointed indentor and is spring-loaded.

Sundt-Bisterfeld Hot-needle Method (15) (16) (17)

A theoretical discussion may be found in (18) and comparisons are made with normal indentation tests (16).

Portable Diamond Indentation Hardness Tester (19)

Wallace Hardness Tester (20) (8)

There are two types: (a) *Dead Load Hardness Tester for Rolls.* Both B.S.903-1950 and I.S.O.-T.C.45 hardness tests can be made with this instrument and by substituting a metric dial micrometer for the standard one, which reads in Rubber Hardness Degrees, the instrument is converted to read in "Softness Scale" used for testing flexible plastics. (b) *Hardness Meter.* This pocket-type hardness tester measures the hardness in B.S. Degrees scale from 30 to 100. From the practical point of view, this scale correlates nearly exactly with the Shore A Scale. Its calibration is simpler than the Shore type.

T.N.O. Hardness Tester (21) (22)

This is a new instrument which employs a sensitive method of depth measurement under load. It is equipped with a device for continually increasing the load during the test, ultimately giving a record of the depth of penetration obtained under certain loads. It can also be used for recording recovery.

A refinement of the above has been developed in this country (22).

Defometer (1)

This is used largely in Germany and measures the force necessary to compress a 10×10-mm. cylinder 4 mm. in 30 seconds.

Indentation Test (23)

Discs 2 in. dia. are subjected to a pressure of 4,800 p.s.i. for 30 seconds by means of a flat-ended cylindrical steel bar 0.178 in. dia. One hour after removal of the load the residual indentation is measured and calculated as a percentage of the original

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Sunday, 9th Oct.	10 a.m.	*HOSTALEN (low-pressure polyethylene)*
	3 p.m.	*Experience with plastic tubes*
Monday, 10th Oct.	10 a.m.	*HOSTALIT C (polyvinyl chloride)*
	3 p.m.	*Fluidized sinter process in high-polymer technique*
Tuesday, 11th Oct.	10 a.m.	*HOSTAPHAN – a new foil on the basis of polyterephthalic acid ester*
	3 p.m.	*The use of cellophane and other plastic foils*
Wednesday, 12th Oct.	10 a.m.	*HOSTALEN (low-pressure polyethylene)*
	3 p.m.	*Experience with plastic tubes*
Thursday, 13th Oct.	10 a.m.	*HOSTALIT C (polyvinyl chloride)*
	3 p.m.	*Applications for MOVIOL (polyvinyl alcohol)*
Friday, 14th Oct.	10 a.m.	*HOSTAFLON (polytrifluorochloroethylene) in extrusion and injection moulding*
	3 p.m.	*HOSTAPHAN – a new foil on the basis of polyterephthalic acid ester*
Saturday, 15th Oct.	10 a.m.	*HOSTALEN (low-pressure polyethylene)*
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thickness. The method was used to investigate plastic table tops.

Zet. 8 Hardness Tester (24)

This is a ball indentation tester for rubber in accordance with Specification D.I.N.3503 (Germany).

Sward Rocker (25)

A rocker oscillates on the test surface and is stopped by expending its energy through frictional resistance. The number of rocks between two fixed angles of amplitude is a measure of the surface hardness. The number of rocks × 2 equals the Sward Hardness (Glass 100). The theory is discussed (26) and a photo-electric counter has been developed (27) (28).

The calibration of this instrument is discussed (54) and comparisons made with other instruments.

Sheen Hardness Rocker (29)

This is similar to the apparatus above. Two types are made, one known as the Pendulum model and the other as the Bubble model. They differ only in the method of indicating the angular limit of rock.

Coated Fabric Tester (30)

This measures the hardness of coated fabrics, films, etc., and consists of a rocking pendulum, a light source, and a photo-electric cell which is exposed to light when the pendulum is rocking with greater height than the initial setting.

Shore Scleroscope (2)

A falling ram is released and the height of rebound determined.

Shore Type A Durometer (31)

This is a critical discussion on the use of the Durometer for hardness testing of vinyl plastics. It is suggested that, if the procedure for calibration and use of the instrument are followed, consistent results may be obtained by experienced operators.

Rex Hardness Gauge (32)

Tests were made, using this instrument, on various vulcanized elastomers under arctic conditions.

It was considered that the results of hardness tests after the vulcanizates have been conditioned for short periods at low temperatures are not always a true measure of the hardness which they will attain in the Arctic.

The hardness of Polyvinyl Chloride was examined (33) and two methods were used, 1 (b) being preferred:—

1. The Shore hardness needle-type penetrator, under spring load without preload. (a) The depth of penetration is read at the moment the instrument is placed on the sample. (b) The depth of penetration is read 10 seconds after the instrument has been placed on the sample (Standard D.I.N.53/503/2, March, 1943).
2. Using a ball penetrator, a load is applied by a weight. Readings are taken 10 seconds after application of the load (Standard D.I.N.-D.U.M.3503, June, 1938).

Wallace Micro Hardness Tester (34)

This is an instrument of new design using the normal indentation method. It works on the null reading principle, which incorporates an electronic null indicator. The depth of indentation is measured mechanically and the indenting shaft is mounted in a frictionless manner. It is useful for hardness tests on small components and is capable of measuring thickness to an accuracy of 0.00001 in.

L.P. Micro Hardness Tester (35)

This instrument has been developed to allow hardness measurements on rubber specimens of about 1 mm. thickness in the same units as the standard instrument. The indenting ball is reduced to 0.4 mm. dia. The readings are made with a microscope.

L.P. Hardness Tester (37)

The instrument has been developed for hardness testing by co-operative work within the I.S.O.

I.S.O. Type Micro Hardness Tester (36)

This instrument, sponsored by the I.S.O., is intended for testing large and small samples of rubber. It will accommodate specimens from 4 mm. to 45 mm. dia. and from 1 mm. to 35 mm. thick. The indentation of a ball-ended pin gives the B.S. Hardness Number.

Brinell Test

Details are given (38) of the Hounsfield Tensometer and Rockwell Hardness Tester, both adapted for making tests on the Brinell method. Comparisons are also made between the results obtained with these machines and the Schmidt-Bisterfeld hot-needle test (15). Phenolic mouldings with various types of filler were investigated.

For general-purpose phenolic materials, it was found that the depth of indentation was related to the degree of cure, whether expressed as a function of moulding time and temperature or measured by acetone extract.

Brinell Hardness methods and tables are given (39) and the hardness of the steel balls used in this test (40).

Quick Durometer (41)

This is a new German durometer and stated to be competitive with the Shore A Durometer.

Clarkstan Gauge (51)

This is a pocket instrument suitable for measuring the hardness of rubber or plastics of a thickness at least ¼ in.

A hardness testing instrument making only minute scratches which cannot be seen by the naked eye has been placed on the market (53). It combines a positive controlled diamond penetrating action with a high-power microscope of 400 magnifications. Tables are supplied for conversion of these readings into Rockwell and other standard hardness scales.

A study of hardness testing of elastomers at low temperatures has been published (55).

Scratch Resistance

A scratch test is where a sharp instrument is caused to move across the surface of a specimen under specific conditions (7).

There are four variables involved: (a) The load on the scratching tool. (b) The velocity of scratching. (c) The tangential force needed to propagate the scratch. (d) The dimensions of the scratch.

A scratch has also been considered as a deformation of uniform cross-section along the surface of the specimen (42).

The scratch resistance should be independent of the load on the scratching tool provided the material is homogeneous.

The whole article is worth studying.

The Zeiss Diritest Machine (43) is described and the author shows that the scratch hardness value obtained by this apparatus depends on the speed of scratching. Elastic hysteresis effects, which are liable to become confusing in the case of ordinary indentation tests, are so small as to be negligible in the case of scratch hardness.

Bierman Scratch Apparatus (44)

This machine is also known as the Microcharacter.

The specimen is attached to a screw arrangement so that a diamond point can be steadily moved over the surface, leaving a mark, the width of which can be measured with a microscope. The diamond has the form of the corner of a cube and is held down with a 3g weight.

The scratch hardness is the load, in kg., divided by the square of the width of the scratch, in millimetres. It is largely independent of the thickness of the specimen.

Mechanical Properties of Plastics—Hardness

Typical Data	*Hardness*	
	Brinell	*Rockwell*
Phenol formaldehyde:		
Type G	37	M 105
Type MS	38	M 105
Type HS	36	M 95
Type HR	—	M 100
Phenol formaldehyde laminates:		
Paper	—	M 100
Fabric	—	M 100
Cast phenolics	32	—
Urea formaldehyde:		
Paper filled	51	M 120
Wood filled	—	M 120
Urea formaldehyde laminates:		
Paper	50	M 120
Fabric	—	M 120
Melamine formaldehyde	—	M 120
Melamine formaldehyde laminates:		
Paper	—	M 120
Fabric	—	M 120
Polyesters:		
Unfilled	—	—
Polyester glass laminates:		
Rovings	—	M 100
Cloth	—	M 100
Mat	—	M 90
Cellulose nitrate	10	R 80–100
Cellulose acetate	12	R 30–100
Cellulose acetate—butyrate	10	R 30–100
Ethyl cellulose	—	R 50–100
Polyethylene	2	R 13
Polytetrafluorethylene	—	—
Polyvinyl chloride (P.V.C.):		
Rigid	—	(Shore) 90
Plasticized	—	Various
Polyvinyl chloride—acetate:		
Rigid	20	(Shore) 80
Plasticized	—	Various
Polyvinylidene chloride	—	M 50
Polystyrene	25	M 70
Polystyrene (and alloys).		
High impact	—	M 20–70
Polymethylmethacrylate	20	M 100
Nylon moulding powder	—	L 95 R 100
Nylon filaments	—	—
Silicones (elastomeric)	Various	—
Natural rubber	Various	—
Hard rubber	—	L 100
Shellac	—	—
Casein	—	M 80
Steel	—	—
Aluminium	—	—

Kohinoor Value (2)

Sharpened pencils, ranging from soft to hard, are used to mark the test surface. The hardness index is the first numbered pencil to show a mark.

Moh Value (2)

Sharp edges of the minerals of the Moh Scale are drawn across the surface of the test piece under light pressure. The softest mineral which gives a scratch is indicated.

The scratch resistance of transparent plastics is measured by determining the scattering of light caused by abrading the surface to be tested by means of falling carborundum particles.

The light scattering is measured photoelectrically (45) or by means of a gloss meter (46).

A study was made of the scratches produced by a needle on natural rubber vulcanizates of varying hardness (47). It was found possible to explain the results qualitatively by reference to the hardness, friction and tear resistance of the vulcanizate.

Scratch tests are classified (48):—

(a) By measuring the weight necessary to produce a scratch of given dimensions. Franz and others determined the weight needed on a diamond needle to produce scratches of a given width. The Graton Selerometer is used in this way.

(b) The determination of the width of a scratch for a given load on the scratching tool. Martens and others used this method. Weights of 20g and 40g are applied to a 90° diamond cone and hardness is calculated from the formula H=I/W. The Eastman Kodak apparatus is basically similar.

Mar Resistance

This is a measure of the resistance of glossy surfaces to abrasive action (49).

There are two stages:—

(a) A series of abraded spots on the surface of the specimens made by dropping increasing amounts of abrasive through a tube of fixed length. An abrader is described.

(b) The measurement of the gloss, before and after treatment, by optical means (50). A glossmeter is described.

Only materials with high specular reflectance can be measured.

It will be noted that this test is very similar to the scratch resistance test (45) (46).

Another method and instrument is described (7).

Falling emery is dropped 66 in. through a tube $\frac{3}{8}$ in. dia. (2) and carborundum No. 80 falling through a tube 25 in. long (38). In both cases the test surface is inclined at 45° to the axis of the tube.

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PATENT REVIEW

The following abstracts have been made from specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. The country of origin for Convention Applications is shown in parentheses. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 2s. 8d. each (including postage).

B.P. 730,877. Moulding compositions of vinyl aromatic resins. H. W. Wehr, jr., W. C. Sager, jr. To: Dow Chemical Co.

With a minor amount of mineral oil for increasing the rate of flow during moulding and for facilitating removal of the moulded products.

B.P. 730,911. Method and apparatus for manufacturing diaphragms and separators for electric cells. To: AB Tudor (Sweden).

Glass fibres are sprayed by a hot gas stream on to a microporous sheet of rubber or thermoplastic synthetic resinous material to form a layer on the sheet.

B.P. 730,928. Primary electric batteries. To: Ray-O-Vac Co. (U.S.A.).

The electrolyte is in a sealed envelope of plastic material which is punctured to permit electrical connection with an electrode of an adjacent cell. The envelope is self-sealing to avoid leakage after being punctured.

B.P. 730,946. Bottle closures. E. A. Blench. To: Kork-N-Seal, Ltd.

A thin band of polyvinyl chloride (copolymers of vinyl chloride and vinyl acetate, or methylmethacrylate) is adhesively attached to a capsule of thin soft metal to facilitate removal without tearing the capsule.

B.P. 730,958. Stripping of plastic coatings from insulated copper wires. H. E. Z. Gordon.

B.P. 731,013. Container for lip-stick, cosmetics or like products. To: Parbel (France).

Refers to the mechanism.

B.P. 731,025. Electrical insulating material and windings insulated therewith. To: Monsanto Chemical Co. (U.S.A.).

A cleavable wire coating composition.

B.P. 731,132. Plastic interpolymers. To: B. F. Goodrich Co. (U.S.A.).

To prepare polymeric materials of a plastic nature that may be used as such in preparing flexible products, thus eliminating the undesirable effects accompanying use of plasticizers.

B.P. 731,134. Polyethylene modified with anti-crack agent. W. McE. Land, W. T. Meyer. To: Union Carbide and Carbon Corp. (U.S.A.).

A copolymer of vinyl chloride and an octyl acrylate is incorporated.

B.P. 731,147. Method of producing optical elements from plastic material. To: L.O.S. Lentilles Ophtalmiques Spéciales (France).

From the basic material, rough shapes are prepared in a mould by polymerization or condensation. The final form is then obtained by pressing between heated dies with further polymerization or condensation.

B.P. 731,150. Injection-moulding machines. A. Strahm (Switzerland).

A number of moulds are successively filled from an injection head. Each mould is furnished with a reciprocal core adapted to be withdrawn to open an aperture through which an injection pipe enters the mould.

B.P. 731,155. Contact lenses. J. T. De Carle.

Corneal lenses can be moulded from a paste comprising a mixture of mono- and polymethyl methacrylate. The moulded material is heated in the mould to such a degree that the methyl methacrylate monomer is polymerized.

B.P. 731,160. Memorial headstones, grave

surrounds, plaques and the like. A. D. Bogen.

A dispersion of vinyl acetate and a plasticizer is incorporated in the concrete mix and also in a terrazzo covering. A final resin coat is given to the polished terrazzo surface.

B.P. 731,181. Laminated articles and their manufacture. To: Farbenfabriken Bayer A.G. (Germany).

For conveyer and driving belts, cables, clutch plates.

B.P. 731,256. Manufacture of polymerization products obtained from acrylic acid derivatives. G. I. M. Bloom, J. E. Duddington, M. F. Vincent, A. H. Wilbourn. To: I.C.I. Ltd.

Refers to polymethyl chloroacrylate.

B.P. 731,417. Closures for bottles, vials and the like. To: Aviso AS, E. and O. Collett and Co. (Norway).

For packing pharmaceutical products (powders, tablets, pills) to prevent moisture from affecting the products. A cap with an inner box-like perforated stopper which contains a moisture-absorbing agent. A polyvinyl resin or polyethylene may be used for the cap.

B.P. 731,449. Paper roll holders. To: British-Australian Paper Co. Pty., Ltd. (Australia).

Particularly for sanitary rolls to limit the length of paper to be unrolled upon each pull.

B.P. 731.461. Ventilating device for the bodies of motorcars and other passenger-carrying vehicles. W. E. O'Shei.

A channel member made of transparent synthetic resin material and arranged along the top of the inside of the window frame.

B.P. 731,503. Nylon fish netting. R. Johnson, R. W. Kolb. To: Drummondville Cotton Co., Ltd.

The knots are "heat-set" into the shape they assume when knotted, no extraneous coating material is used.

B.P. 731,505. Process of seam welding of sheets of plastic material. M. C. de Chizy, P. Montagnon.

The projecting edges of two sheets seam welded in the usual way are not cut away but folded back, and a second weld is produced perpendicular to the first seam.

B.P. 731.509. Printed electric circuits. To: Erie Resistor Corp. (U.S.A.).

Stencils, e.g., of polyethylene.

B.P. 731,513. Adhesive mounting plate. To: Autotyre Co. (U.S.A.).

For bathroom fixtures, etc.

B.P. 731.589. Armoured-sheath electric cables and their manufacture. To: Forges et Ateliers de Constructions Electriques de Jeumont (France).

An intermediate armouring is enclosed by superposed extruded layers of a thermoplastic material forming a continuous outer casing, preferably of incombustible and chemically inert material.

B.P. 731,615. Thermosetting urea-formaldehyde moulding compositions. A. White. To: I.C.I. Ltd.

A diether is included and a small amount of mould lubricant. A particularly improved appearance is claimed compared with moulded articles containing no diether.

B.P. 731,630. Manufacture of moisture-proof, heat-sealable films. R. A. Rose, C. H. Phillips. To: British Cellophane, Ltd.

Certain organic derivatives of hydrous aluminium silicate mineral in fine division added to the (known) ester type wax constitute a superior slip agent for vinylidene chloride copolymer coatings and self-sustaining films.

B.P. 731,634. Plastic material and process of manufacture. To: John Milton Pty. Ltd. (Australia).

An intimate mixture of two resin-based components and finely divided lead as protection against radioactivity. The two components are a vinyl polymer and a polymethyl methacrylate prepared separately.

B.P. 731,649. Method of printing blown plastic bottles having flexible walls. To: Peerless Roll Leaf Co. Inc. (U.S.A.).

The die is stationary at the time of stamping and the work (polythene) is brought into contact with the die by means of compressed air.

B.P. 731,652. Plastic moulding machines. To: Frederick L. Cook and Williams Pty. Ltd. (Australia).

An automatic compression moulding machine hydraulically operated and including a timing device and a support for the ejected article, preferably also a mould-charging device. The actuating mechanism may be adapted for the conversion of a manually controlled machine.

B.P. 731,906. Clothes peg. K. H. B. Bergqvist (Sweden).

Two compression moulded jaws connected by a spring.

B.P. 731,920. Hooped skirts and like garments. G. W. H. Stevens.

Use of nylon or polyvinyl chloride (add. to B.P. 695,446).

B.P. 731,925. Toys. V. Valentine.

A doll or animal of the soft-bodied type with movable limbs and head attached to the trunk by press stud parts moulded in position on trunk, limbs and head.

B.P. 731,940. Surface coating mass containing polyethylene. W. Spindler, W. Scheermesser (Germany).

B.P. 731,964. Brake hood grips for cycles. L. Gaisman. To: Shockstop Rubber Products, Ltd.

Of resilient material, which may be a synthetic resin material, with longitudinal corrugations.

B.P. 731,974. Process for coating surfaces. S. T. Deakin. To: Edison Swan Electric Co., Ltd.

Coating conductors and rollers for processing with polytetrafluoroethylene (good insulating properties, moisture- and fungus-repellent). The plastic material is wound around the surface, then a metal strip is wound uniformly around the plastic to act as a mould. When heat is applied the plastic sinters into a homogeneous coating.

B.P. 732,040. Strengthened parts of garments. G. W. H. Stevens.

Stout monofilaments (all sections into which a plastic can be drawn or extruded such as a circular, oval, rectangular strip cruciform, T, and U sections), are incorporated. (Div. out of B.P. 731,920.)

B.P. 732,091. Curved extrusion process and apparatus. R. A. Fisch.

The thermoplastic material is extruded downwards through a die with the desired channel-forming orifice. The product is taken up by a rotating support fitting into the channel and passed through a quenching tank, then guided into a storage container. Polyethylene is mentioned in the example but also other materials such as cellulose acetate, polyvinyl compounds, rubbers are suitable.

B.P. 732,092. Advertising appliance. M. Urch.

One section of an article outside, one inside a shop window, both sections held together by a magnet. A transparent plastic sheet is placed against the inside of the window around the article and marked as if splintered.

B.P. 732,097. Filled polymer compositions. To: E. I. Du Pont de Nemours and Co. (U.S.A.).

25% to 80% of finely divided particles of polytetrafluoroethylene is mixed with 20% to 75% of finely divided asbestos to be moulded under pressures exceeding 1,000 lb./sq. in.

B.P. 732,107. Fused fabric assemblies. L. Bihaly. To: Trubenised (Gt. Britain), Ltd.

Use of polythene strands in the interlining of semi-stiff fabrics.

B.P. 732,118. Method of producing resin-bonded moulds and cores, moulds and cores so formed, methods of casting using these, and castings made thereby. E. S. Renshaw, T. H. Wilson. To: Ford Motor Co., Ltd.

Silica sand bonded with 4% to 10% phenol formaldehyde resin.

B.P. 732,142. Artificially illuminated sign. Pearce Signs, Ltd., J. H. G. Pearce.

A casing in the shape of the letter desired carries a tubular lighting unit having the general shape of the letter with transparent front plates, etc. The casing may be a plastic moulding.

B.P. 732,248. Protective device for workers in dusty atmospheres. F. Lonne.

A hood with a face piece of "Plexiglass" across which an electric blower produces a compressed air stream.

B.P. 732,253. Acidic polyester-ethoxyline resinous compositions. To: General Electric Co. (U.S.A.).

As moulding compositions, as a sealant for cracked glass surfaces (bushings), for preparing magnetic materials of high breaking strength. Considerable variation of properties possible.

B.P. 732,257. Synthetic resin moulding compositions and moulded articles. To: American Viscose Corp. (U.S.A.).

Cotton particles which carry a non-fibrous cellulose ester thereon constitute a very desirable filler for the thermosetting resins, imparting to the moulded product superior impact strength.

B.P. 732,260. Resin-impregnated mica paper insulation. To: General Electric Co. (U.S.A.).

B.P. 732,284. Transfer material. To: National Cash Register Co. (U.S.A.).

A web of base material has a rupturable surface film containing liquid inclusions of marking fluid. Throughout that film is provided a dispersion of hard, bead-like particles of inert solid material (e.g., polyvinyl acetate) to protect the sheets when stacked for storage.

B.P. 732,321. Closures for tiltable dispensing valves. J. W. Soffer. To: Development Research Inc.

B.P. 732,385. Synthetic resin coated compositions for metals. To: Pyrene Co., Ltd. (U.S.A.).

A mixture of a film-forming synthetic resinous material which also contains basic zinc chromate and at least one certain phosphate.

B.P. 732,409. Film casting surfaces. To: Celanese Corp. of America (U.S.A.).

The surface of a film casting support is coated with a substitution derivative of cellulose, which is converted at the surface into regenerated cellulose and acted upon with a cross-linking agent to form a smooth, hard, water-resistant casting surface.

B.P. 732,413. Hair curlers. G. Pearce. To: Henry Serventi, Ltd.

The sides of the hollow spool of circular cross section are straight and parallel. inclined teeth are provided at the ends of the spool so as to engage or disengage the hair by rotating the spool.

B.P. 732,421. Process of applying coloured designs on fabric. G. J. L. Wooldik.

The fabric is pretreated with a synthetic resin (polyvinyl and polyacryl resins are suggested) so that the individual threads of the fabric are coated without filling the meshes of the fabric.

B.P. 732,475. Tap jumpers. J. C. Tannock. To: Plastomatic Ltd.

The portion of the stem, outside the convex (plastic) head is constructed separately (of metal) and has a shank fitted into an axial hole in the internal portion of the stem.

B.P. 732,509. Porous polyvinyl formal. C. L. Wilson.

An aqueous solution including polyvinyl alcohol, formaldehyde and an acid catalyst is arranged in a thin layer in contact with air. Solution and air are mingled while reducing the pressure thereon to produce a foam or froth.

B.P. 732,542. Pourer for containers such as bottles and the like. J. Reynolds.

A disc-like portion and a depending hollow plug formed in one piece, from, e.g., polythene, is inserted as pourer between the neck (glass) and the screw cap (metal).

B.P. 732,547. Preparation of finely divided cellulose ethers and mixed ether-esters. To: Hercules Power Co. (U.S.A.).

For plastic coating compositions.

B.P. 732,575. Moulding compositions. To: Emerite Corp. (U.S.A.).

Lignocellulosic materials are reacted with furfural and urea in the presence of an acid. For table tops, building boards.

B.P. 732,684. Container closure plug and closure combination. To: American Flange and Mfg. Co. Inc. (U.S.A.).

A barrel or drum closure plug is formed of polyethylene or similar material. One portion of the plug secures it in the neck of the container, another portion above the first one serves as a gasket.

B.P. 732,688. Ventilation of beehives. G. W. Lawes.

One side of the ventilator chamber is made of perforated metal, the other sides, including that adjacent the hive, may be made of plastics.

B.P. 732,699. Composition for the production of plastic articles or coverings. H. M. Anfinset (Sweden).

An inorganic filler comprising hydrous mica (30% to 100%) in polyvinyl chloride.

B.P. 732,707. Sprinkler closures of or for containers. H. L. Gee.

The medial part (sealing disc) may be of polyethylene, polyvinyl chloride or copolymers thereof (elastic and thermoplastic). It has apertures which on rotation register with perforations of the closure.

B.P. 732,711. Resinous esters of alkenylphenol-aldehyde condensates. To: British Resin Products Ltd. (U.S.A.).

B.P. 732,756. Shanked buttons and stud fasteners. A. E. Davies, M. M. Davies.

The stem between the flat base and the head is inclined to the base. The button may be made of plastics.

B.P. 732,774. Production of decorated articles from thermosetting synthetic resins. Fairey Aviation Co., Ltd., J. B. Cameron, L. H. Hayward.

An absorbent paper wafer with the design printed on it is degreased and then impregnated with synthetic resin solution, dried and applied to the surface of the plastic moulding before the curing is completed.

B.P. 732,782. Extrusion device for the continuous production of endless foils and strips from thermoplastic material. To: Dynamit A. G. vormals Alfred Nobel and Co. (Germany).

A number of extrusion conduits are arranged in a block transversely to the extruding direction. The conduits have narrow elongated outlet slots adjoining end to end so that they form a narrow elongated nozzle. Extruding means (pistons, worms) are arranged in each of the conduits operated by common driving means.

B.P. 732,823. Synthetic resinous compositions. To: General Electric Co. (U.S.A.).

A dipropylene glycol maleate polymer to which styrene is added to form a thermosetting casting composition for encapsulating transformers and the like electrical apparatus.

B.P. 732,835. Floats for carburetters. W. G. Richardson. To: Intermit Ltd.

Formed from interfitting or abutting components moulded from petrol-proof plastics and secured to define a hollow body by a petrol-proof cement. Bakelite X10930 is mentioned as suitable plastics material.

B.P. 732,838. Manufacture of microporous material. To: Accumulatoren Fabrik A.G. (Germany).

A swellable polymer is used (polyvinyl chloride) mixed with wood-flour.

B.P. 732,894. Manufacture of films of organic thermoplastic materials. J. Browning, G. Lindsay. To: I.C.I. Ltd.

A normally solid material is extruded in the molten state through an annular die and the extruded tube continuously inflated. The inflated film is drawn downwards into a cooling liquid where the inflating medium is trapped below the surface of the liquid by nip rolls or a liquid seal.

B.P. 732,921. Method of producing a packing for fragile articles. Leonard Gould and Co., Ltd., W. Sturgess.

A roughly formed dry block of wood wool of the desired shape is sprayed over side and bottom with a urea formaldehyde solution while the nesting area may be bonded with a suitable thermoplastic binding agent, the preformed block to be finished in a mould.

B.P. 733,048. Round box made of synthetic resin or the like. H. Kruft. (Germany.)

A round needle box with fanlike arranged needle channels in the lower part covered by a transparent lid. The rim portion of the lid is provided with a peripheral discharge opening and a coil spring in a circular channel keeps the lid, i.e., the discharge opening, in closed position.

B.P. 733,076. Portable container useful, inter alia, as a display or serving stand. F. N. Potter.

Suitable also for picnics. The cover of frustoconical shape may be transparent plastic.

B.P. 733,122. Method and machine for perforating sheet material. A. M. Andrews (U.S.A.).

Thin perforated strips of plastics may be used, e.g., for sprinkler hoses. The holes are made without weakening the material by first puncturing the sheet, then placing the sheet between electrodes and maintaining an arc discharge through the hole for a predetermined time sufficient to heat and fuse the material immediately surrounding the puncture.

B.P. 733,151. Attachment of flexible sheet material to a support. Silver and Eddington, Ltd., B. Eddington, W. Taylor.

Covering material is fixed to the top of a table or a chair by folding a marginal portion of the sheet into a groove, making a double fold and pressing a wedging strip over it into the groove. Polyvinyl chloride may be used for sheet and wedging strip.

B.P. 733,154. Inflatable balls. G. Thornber. To: Benjamin Crook and Sons, Ltd.

A plurality of leather sections each having bonded to its outer face one or more layers of a flexible plastic.

B.P. 733,163. Toilet-roll holders. C. Stead.

B.P. 733,192. Production of cellular products from polyvinyl acetals. L. B. Macqueen, F. Franks. To: Expanded Rubber Co., Ltd.

Polyvinyl alcohol is dissolved in water containing the aldehyde to form the acetal. A cationic foaming agent is added producing a foam of high stability towards acid.

B.P. 733,295. Illuminating a door handle of a motor vehicle. F. Porsche, Dr. Ing. h.c. F. Porsche K.G. (Germany).

Use of a translucent handle with a portion made of transparent material.

B.P. 733,324. Dispensing means for semi-fluid or pasty substances. M. Ellis.

A plastic collapsible refill in a hollow rigid cylindrical (plastic) container with a spring-held piston inside having a projection outside to push the piston through the container. The container is closed by a cap.

B.P. 733,334. Method and apparatus for processing interior surfaces of tubular containers and other articles. To: Rheem Mfg. Co. (U.S.A.).

The invention is described with relation to conveyor line handling of steel drums for coating welded seams with a polythene powder spray. A burnishing and a coating device (blast tube) are arranged on a carriage driven by an automatically reversing motor.

B.P. 733,338. Belts suitable for conveyors. J. Lewis. Rubber Improvement, Ltd.

A fabric interlayer and thermoplastic covers (or two or more interlayers with a thermoplastic layer in between). The layers are assembled to form a handable carcass, then passed to a machine for fusing.

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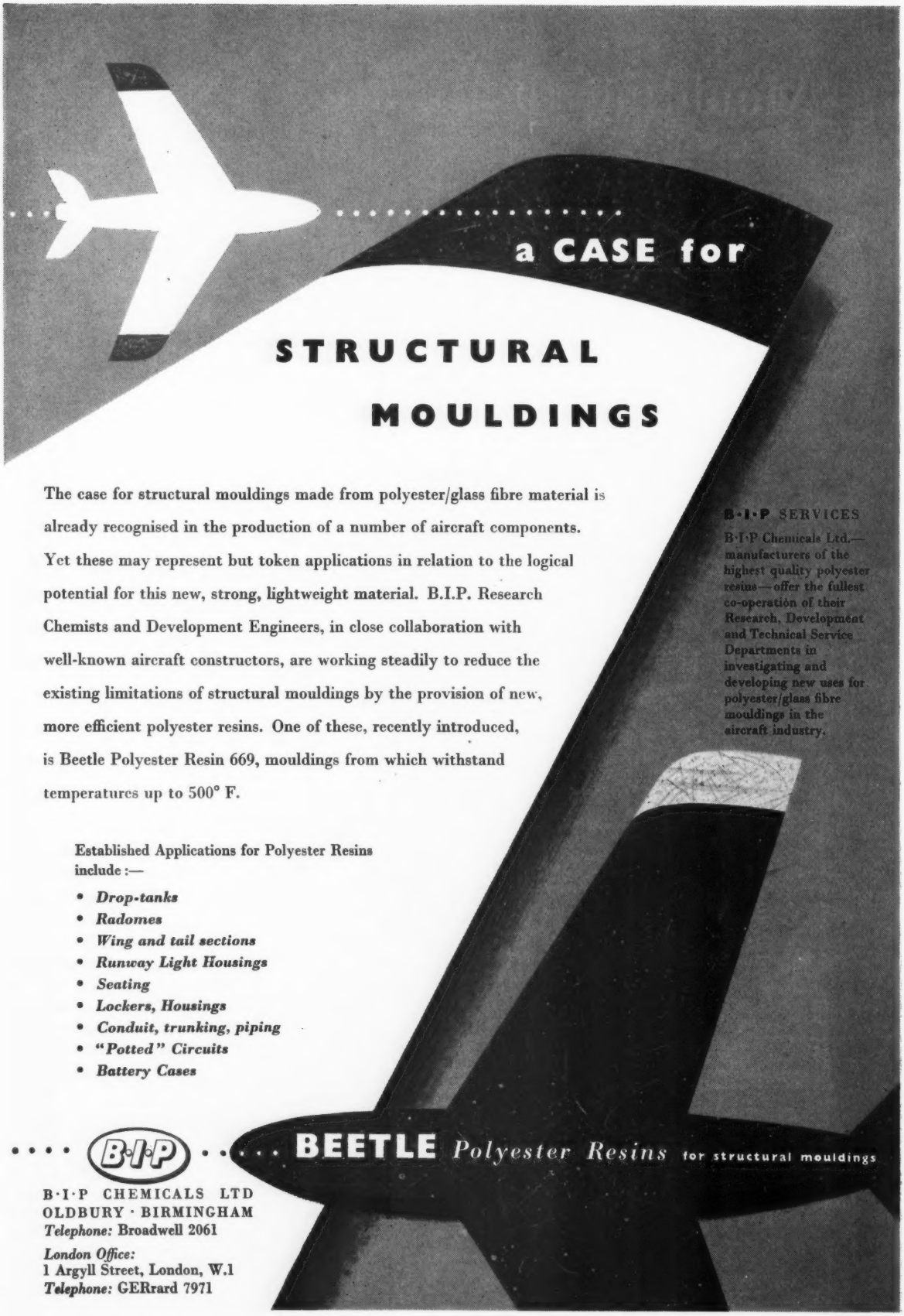

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The case for structural mouldings made from polyester/glass fibre material is already recognised in the production of a number of aircraft components. Yet these may represent but token applications in relation to the logical potential for this new, strong, lightweight material. B.I.P. Research Chemists and Development Engineers, in close collaboration with well-known aircraft constructors, are working steadily to reduce the existing limitations of structural mouldings by the provision of new, more efficient polyester resins. One of these, recently introduced, is Beetle Polyester Resin 669, mouldings from which withstand temperatures up to 500° F.

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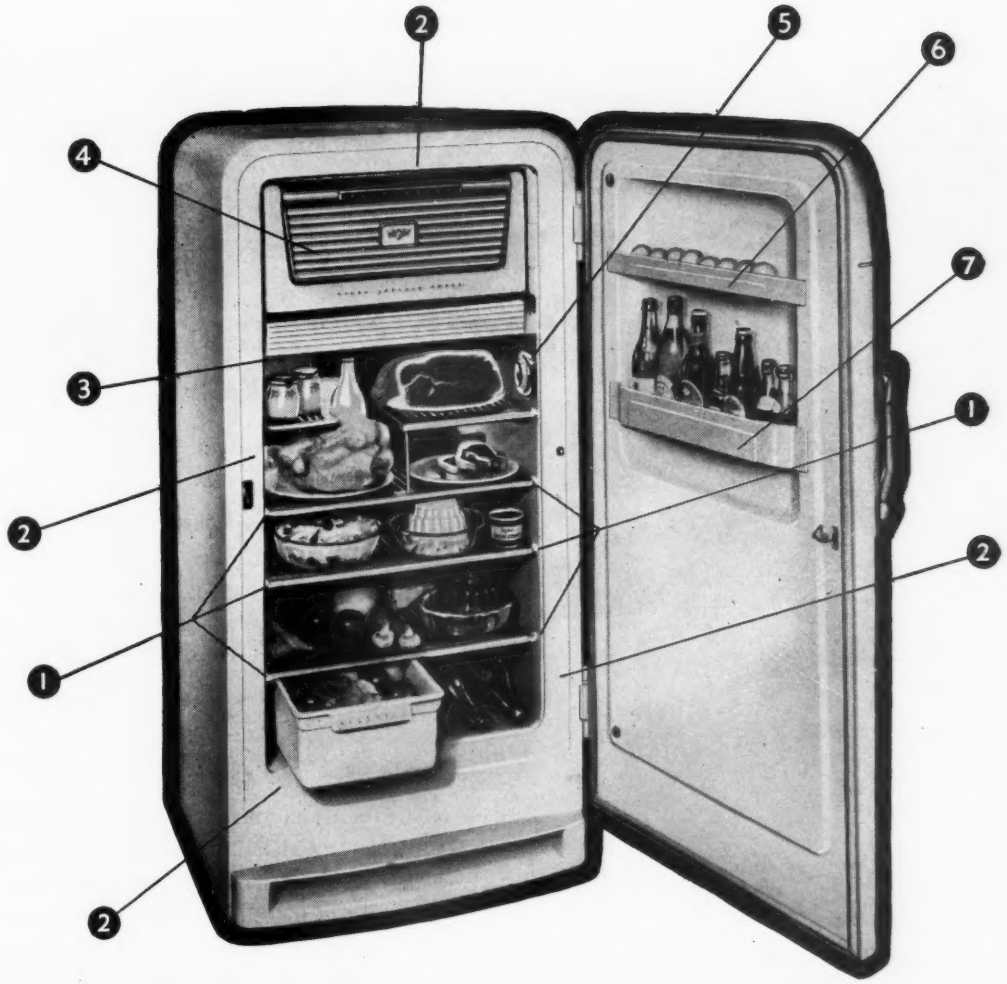

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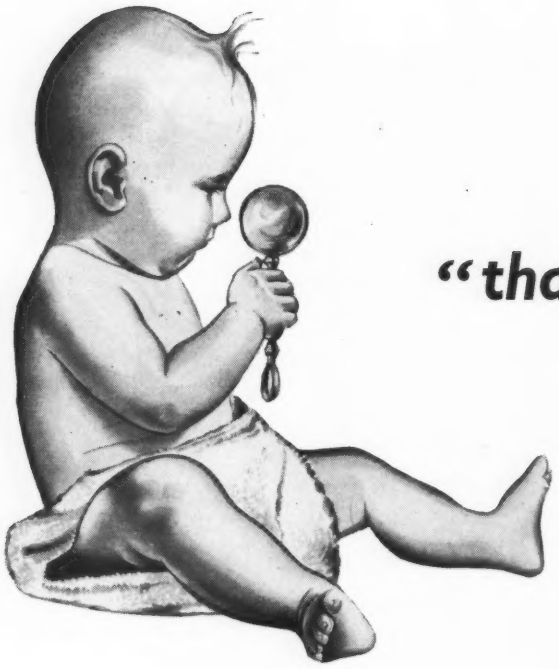

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An appreciative child, our Little Willie; know's a good thing when he sees it. Asked to enlarge on the subject, he'd tell you that the object of his critical scrutiny was made in a "HYPREZ" finished mould.

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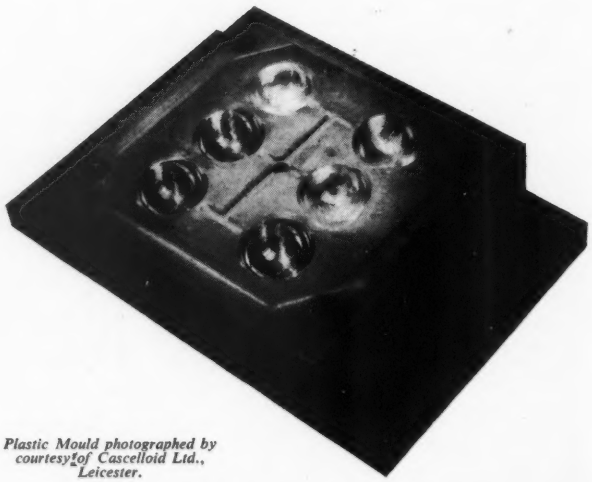
Those who are tempted to goad Little Willie into a long and technical discourse about microns and things, are advised to write to us. We will gladly supply the information and advice you seek—quickly and intelligibly!



Plastic Mould photographed by courtesy of Cascelloid Ltd., Leicester.

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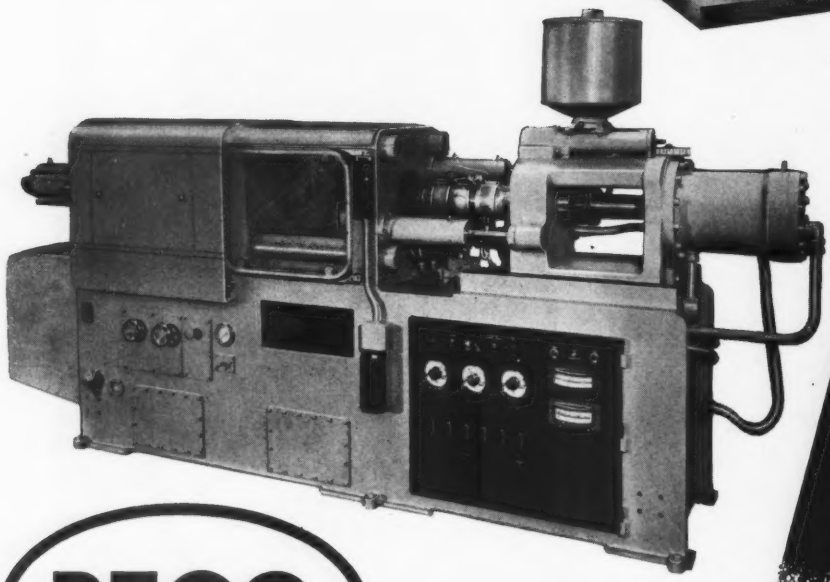

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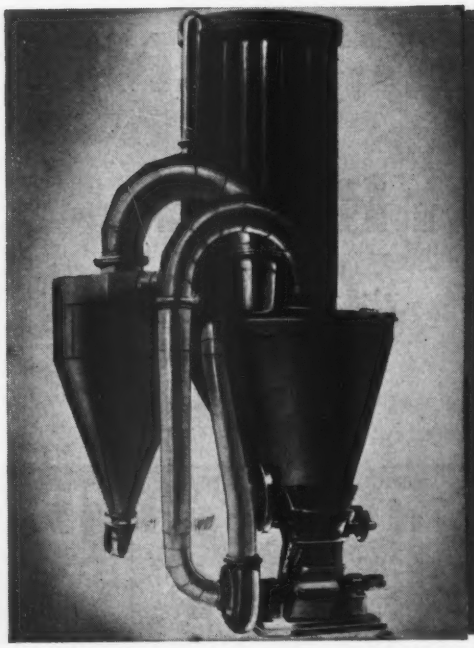

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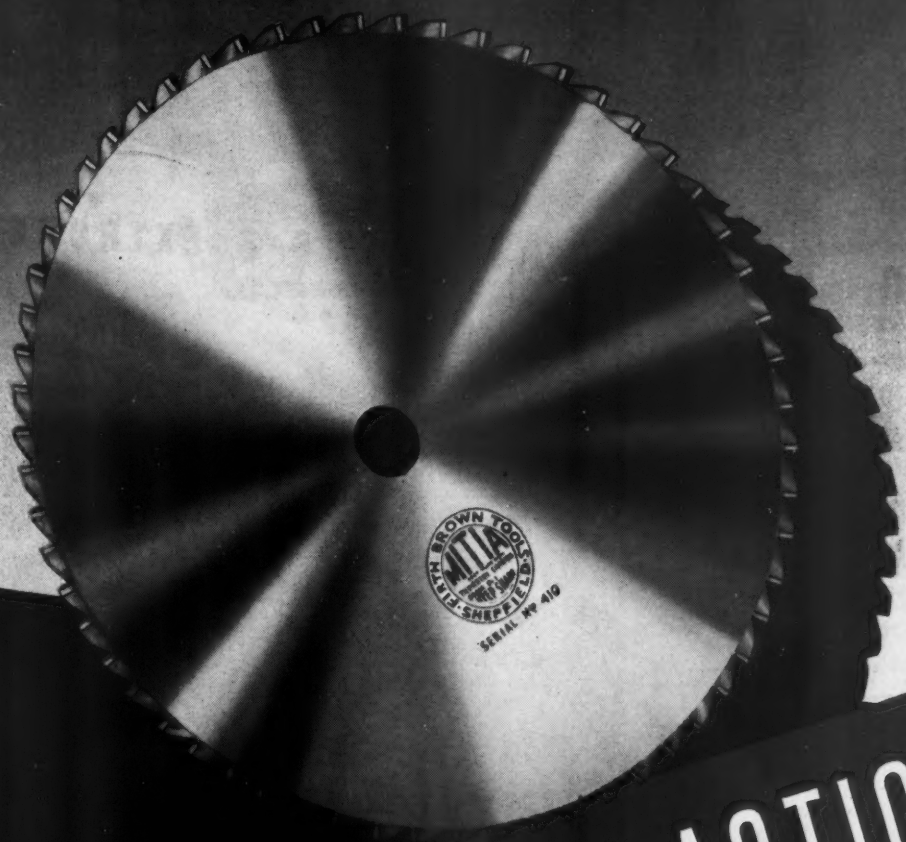

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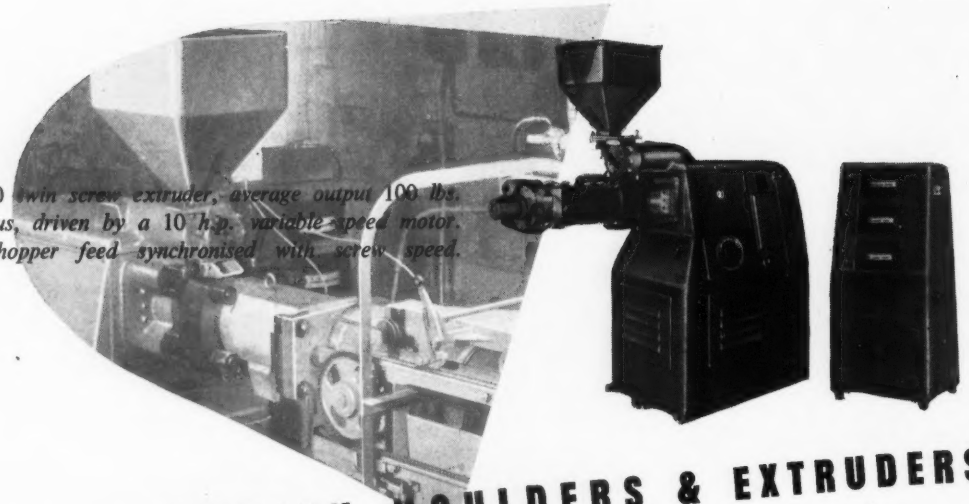

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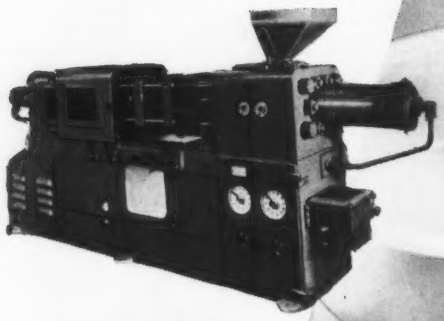

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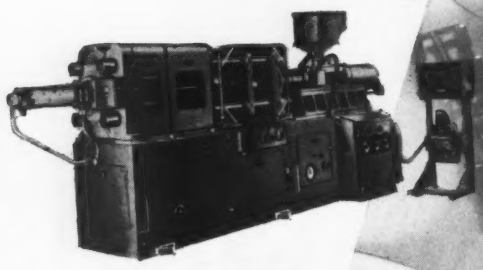
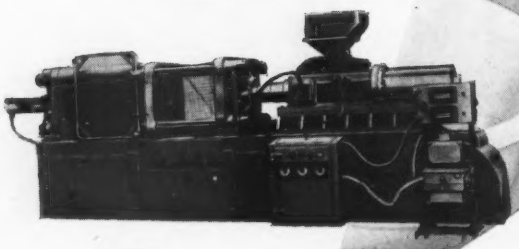


The dependable S.H.8/10 injection moulding machine will produce up to 10-12 oz. per shot. This machine incorporates an hydraulically operated retractable injection unit.



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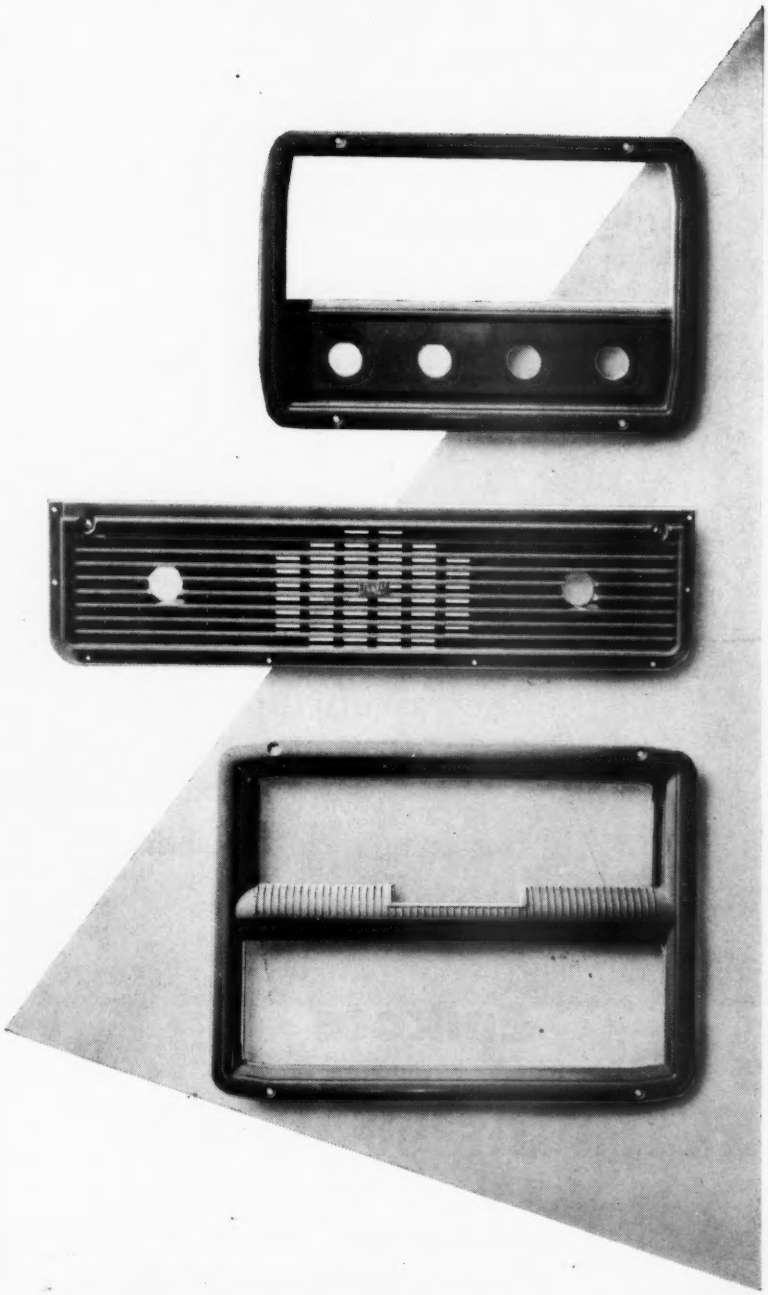
W.W.B. precision mouldings



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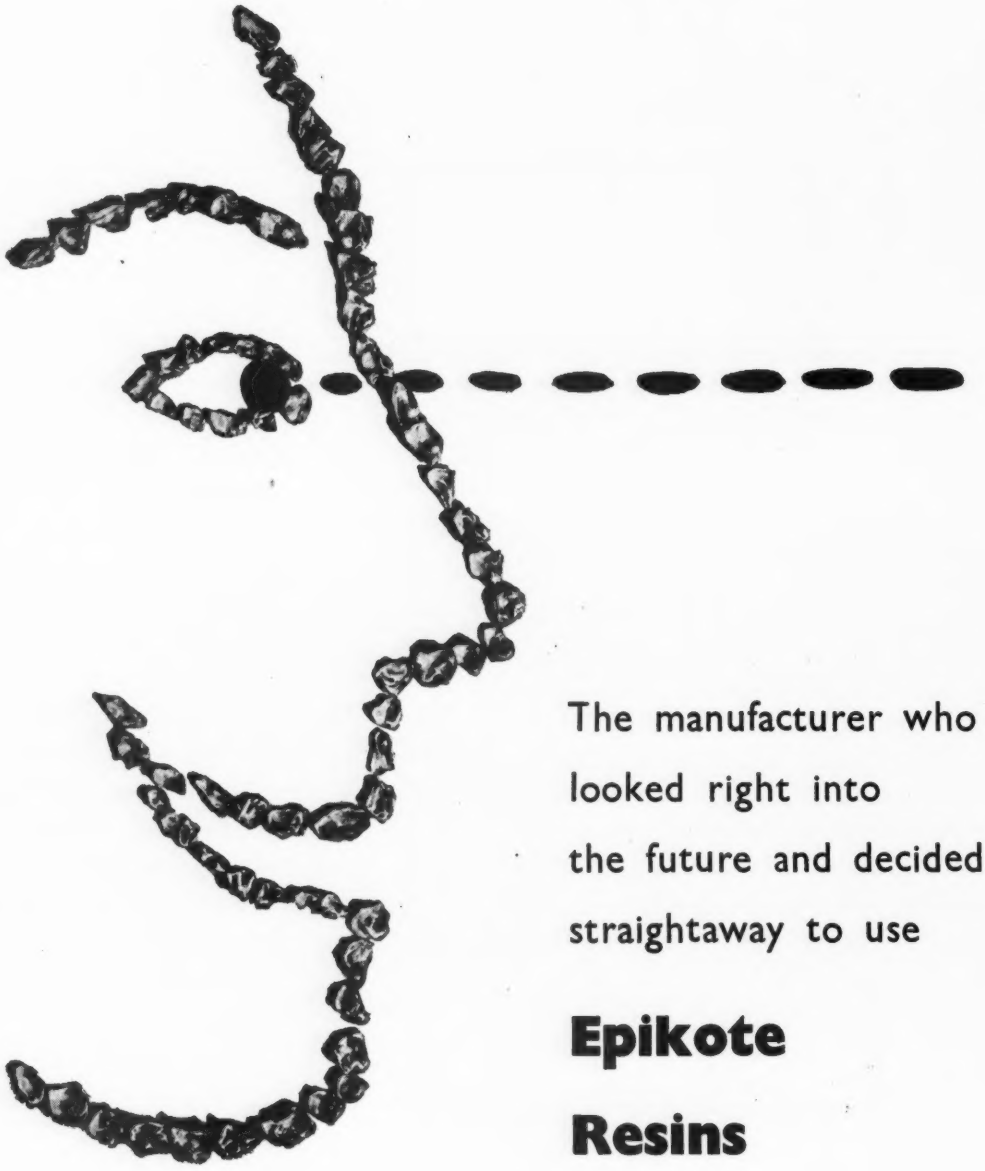

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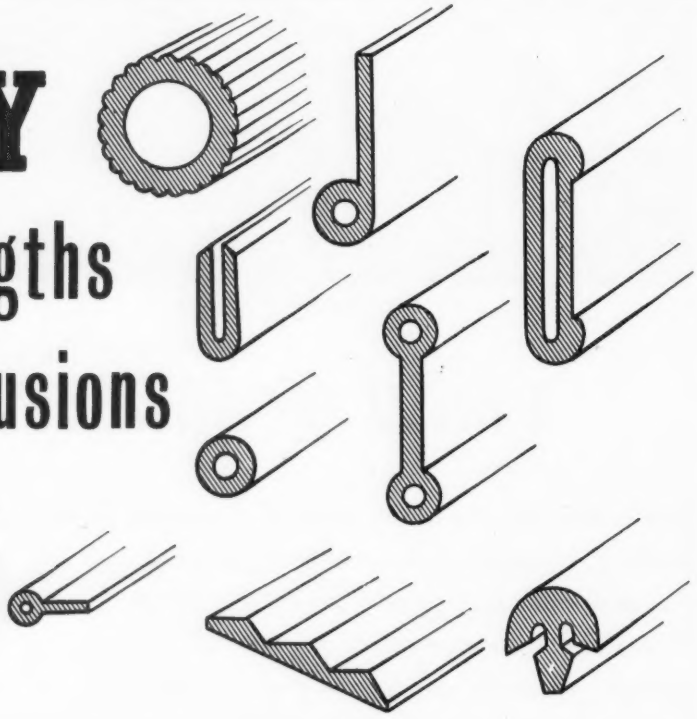
go to great lengths to provide extrusions to the sections you need . . .



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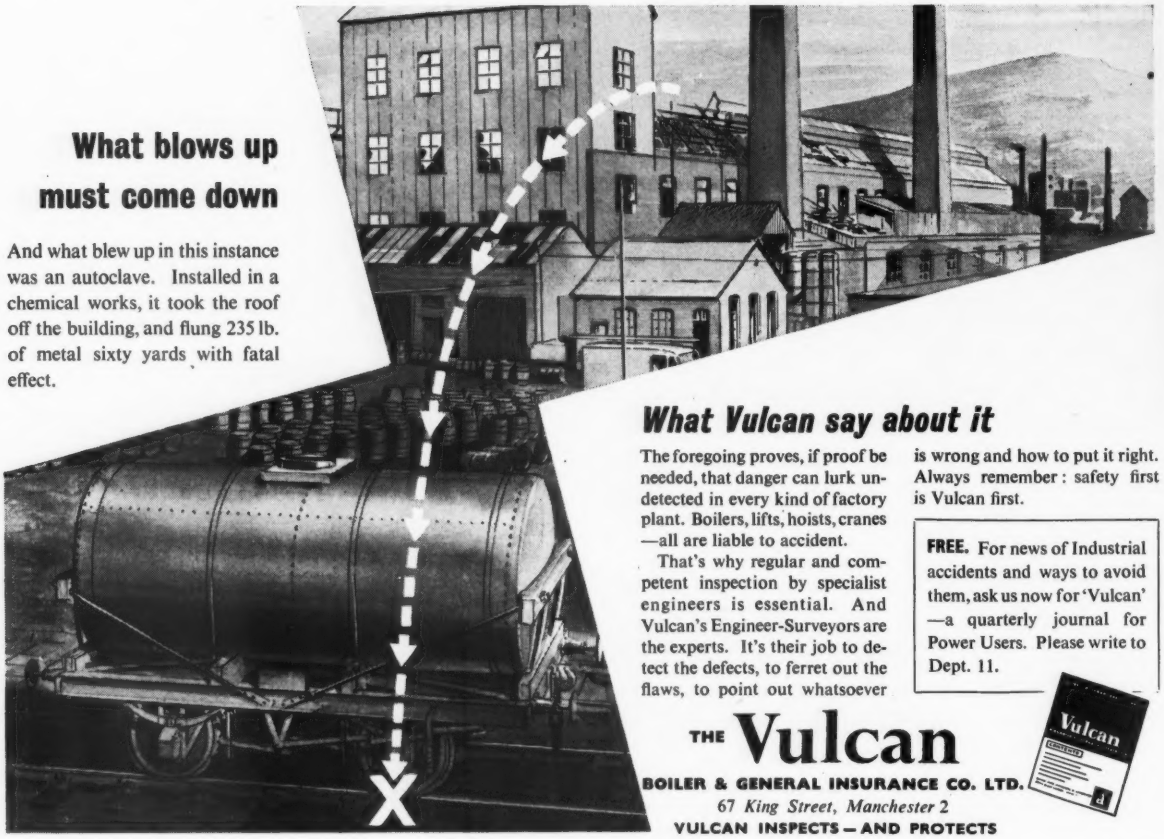

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MODEL NUMBER	150-H-6	300-H-12	400-H-20	800-H-48
Capacity (oz.–Single Feed)	6	12	20	48
Capacity (oz.–Double Feed)	8	16	28	64
Material Injected (cu. in. per min.)	440	1035	1330	2895
Plasticizing Capacity (lbs. per hour)	60	100	135	350
Mould Clamp Capacity (tons)	150	300	400	800
Mould Space (hor. × vert.):				
(a) Full Platen Vert.	10½″ × 25″	16½″ × 33″	20½″ × 42″	36″ × 54″
(b) Full Platen Hor.	20½″ × 15″	30″ × 20″	36″ × 26½″	54″ × 36″
Daylight Opening without Ram Spacer	20″	30″	40″	55″
Daylight Opening with Ram Spacer	16″	26″	34″	47″
Mould Thickness without Ram Spacer	10″	10″	15″	20″
Mould Thickness with Ram Spacer	6″	6″	9″	12″
Clamp Travel (max.)	10″	20″	25″	35″
Motor Horse-power	20	40	50	100
Shipping Weight (pounds)	14500	22000	39000	75000

NOTE: All ratings based on moulding general purpose polystyrene

Other H.P.M. Models are available with these capacities:—

STANDARD
Model 600-H-32 Capacity 32 ounces.
,, 1200-H-80 ,, 80/100 ,,

PRE-PLASTICIZING
Model 400-P48A Capacity 48 ounces.
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From 6 ounces to 400 ounces; with mould clamping pressures from 150 tons to 3,000 tons . . . that's the scope of the new H.P.M. range.

Each machine is new, designed with many outstanding features. High capacity plasticizing chambers, weigh feeders, greater 'shot' capacities, increased daylight and stroke, quiet pumps, and sub-plate mounted valves reducing piping to the absolute minimum, are some of the reasons why H.P.M.'s mould better, faster and at lower cost.

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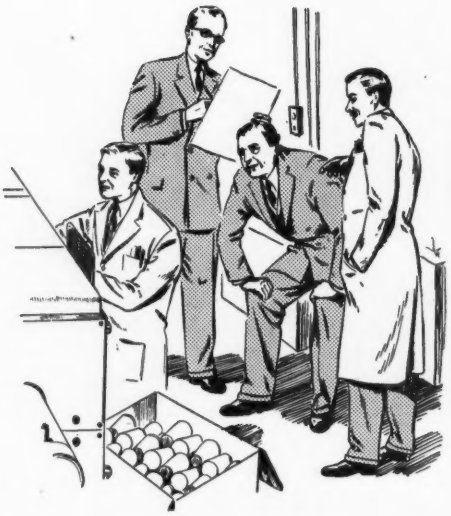
Many of them are by KENURE



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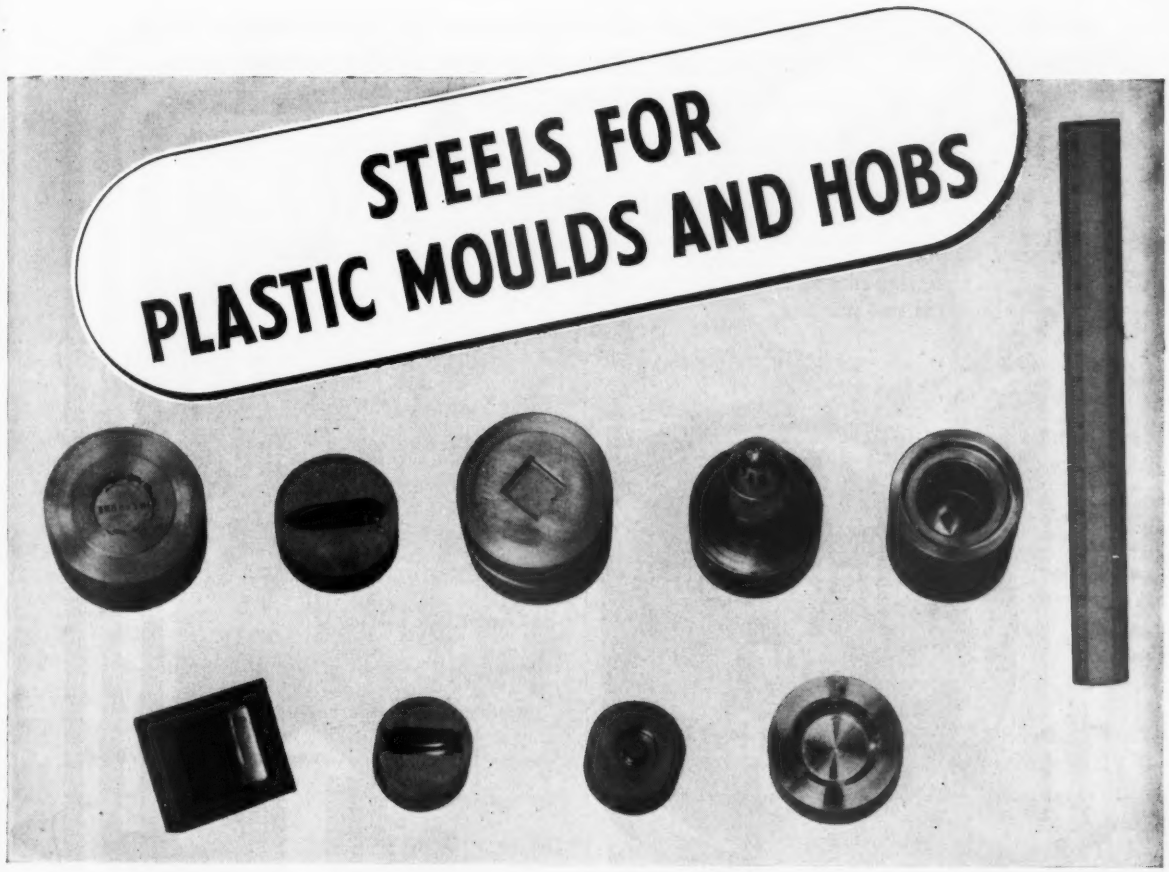

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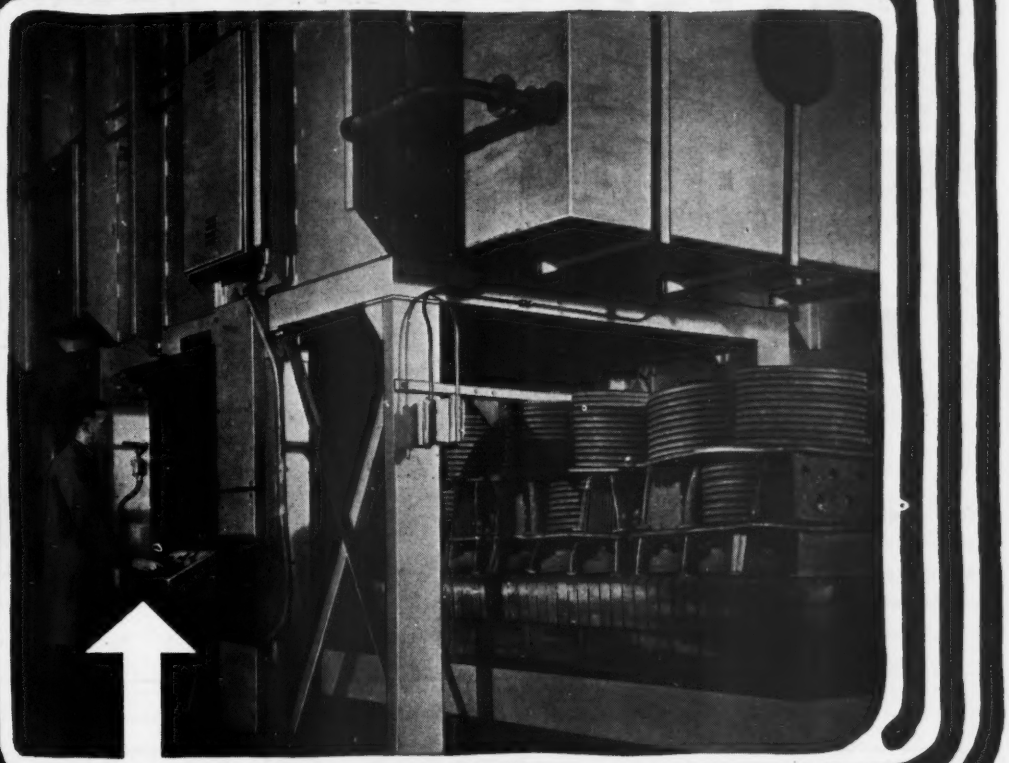

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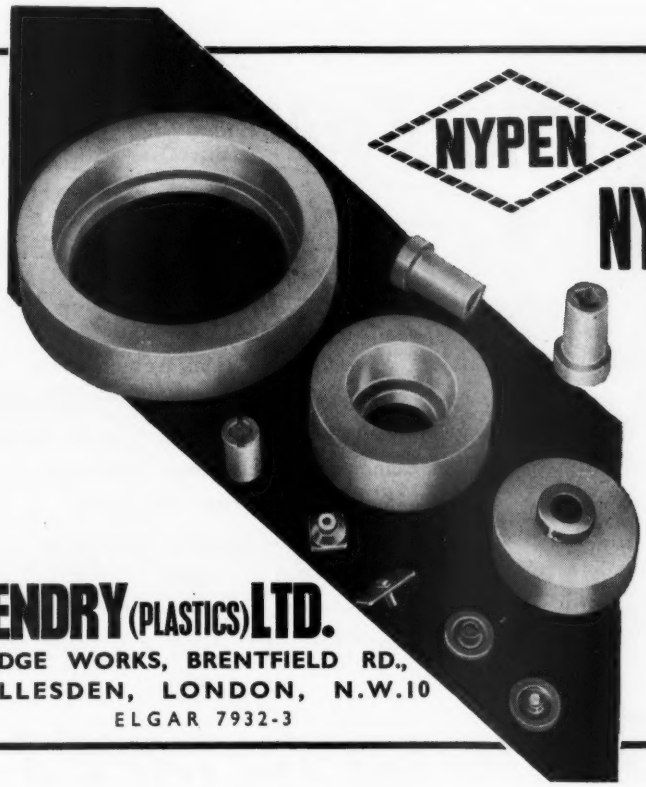

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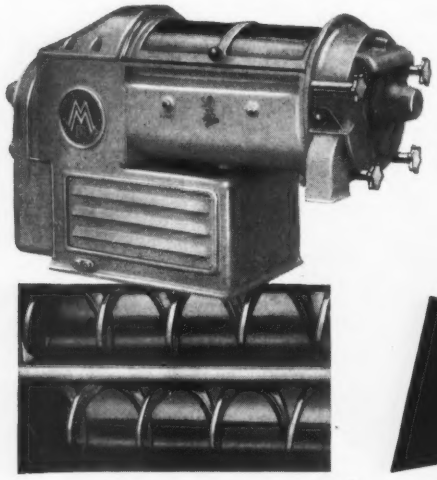

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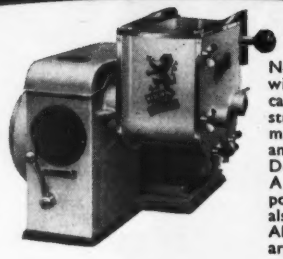

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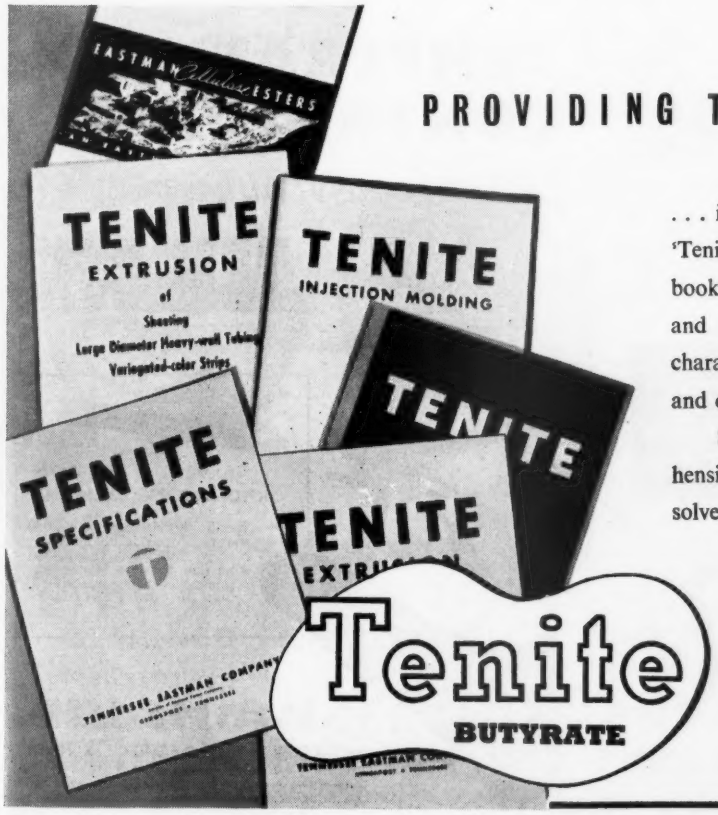

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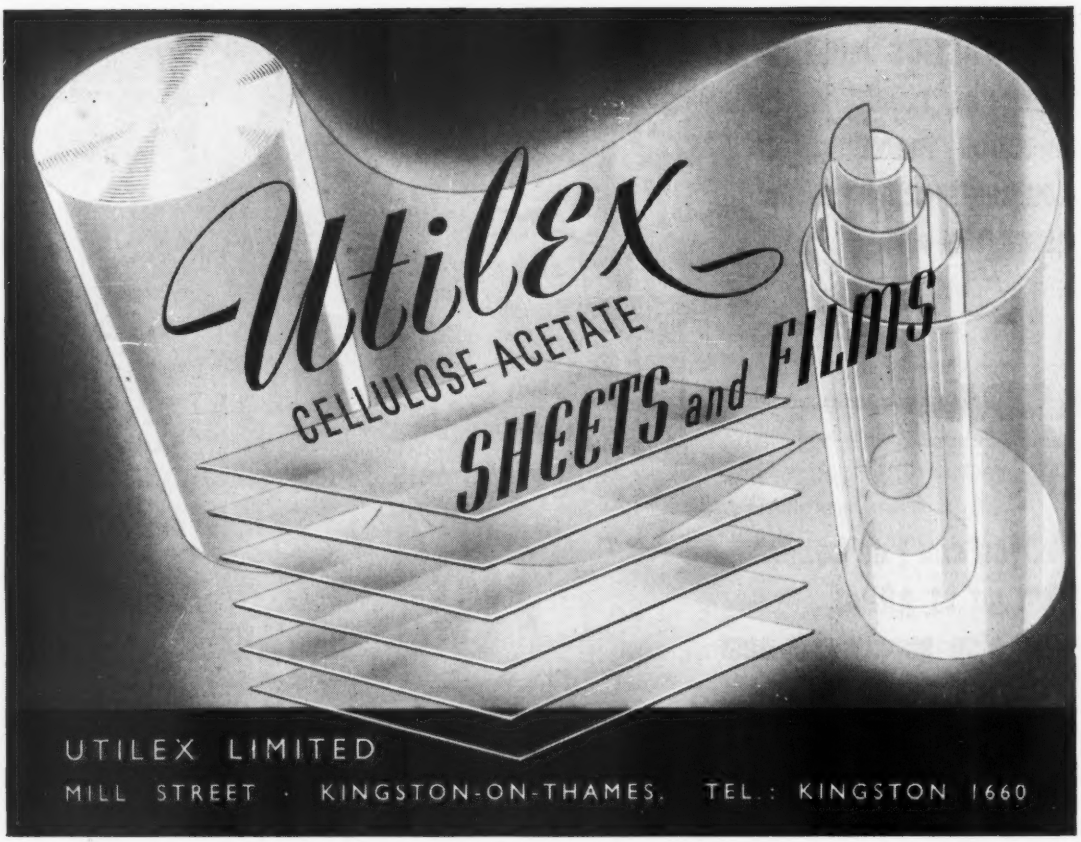

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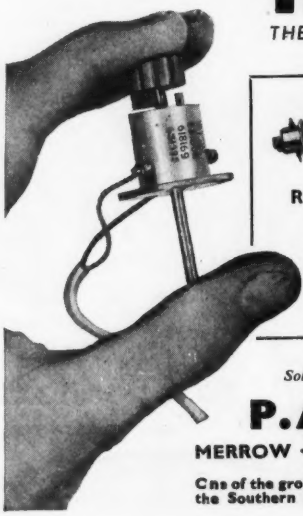

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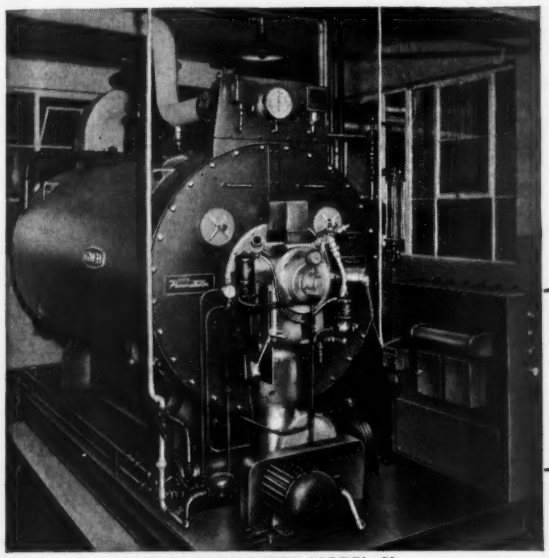

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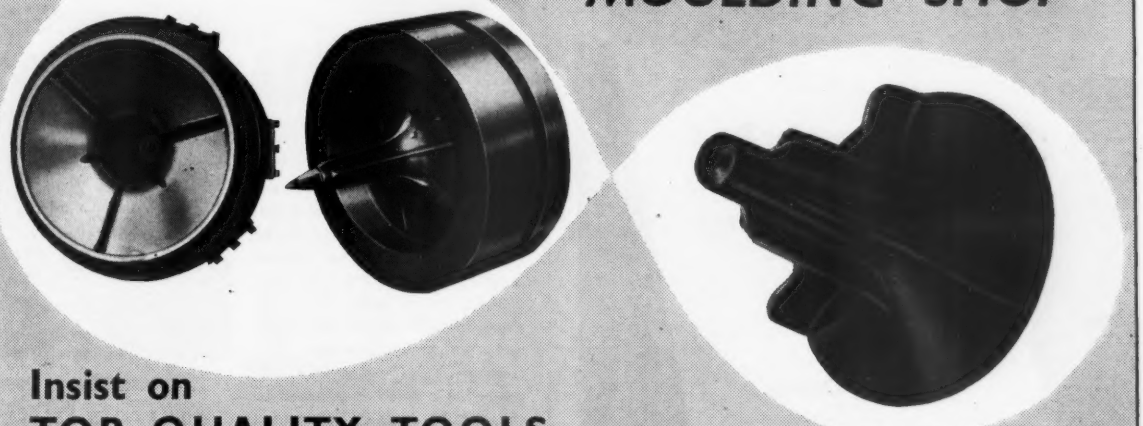

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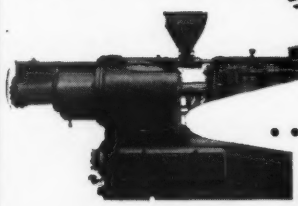
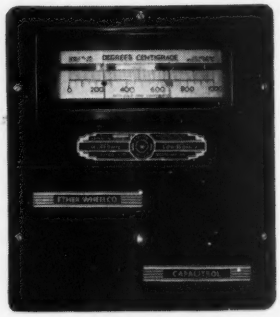


. . . on Temperatures



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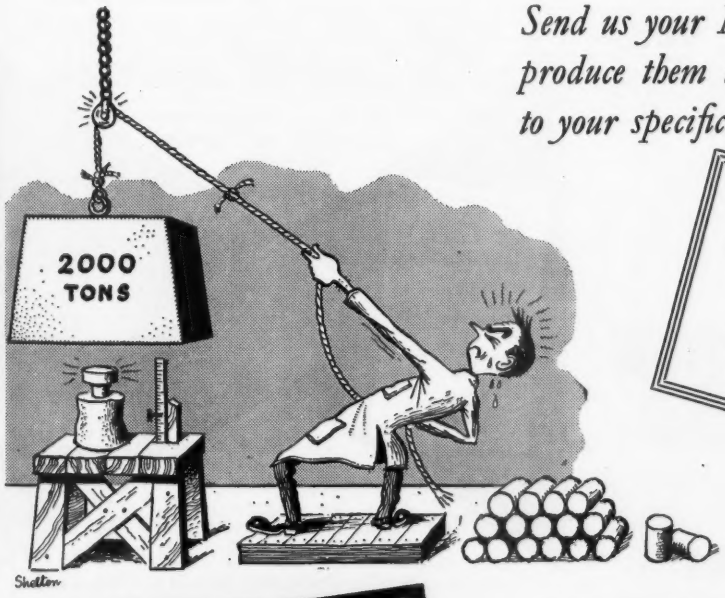

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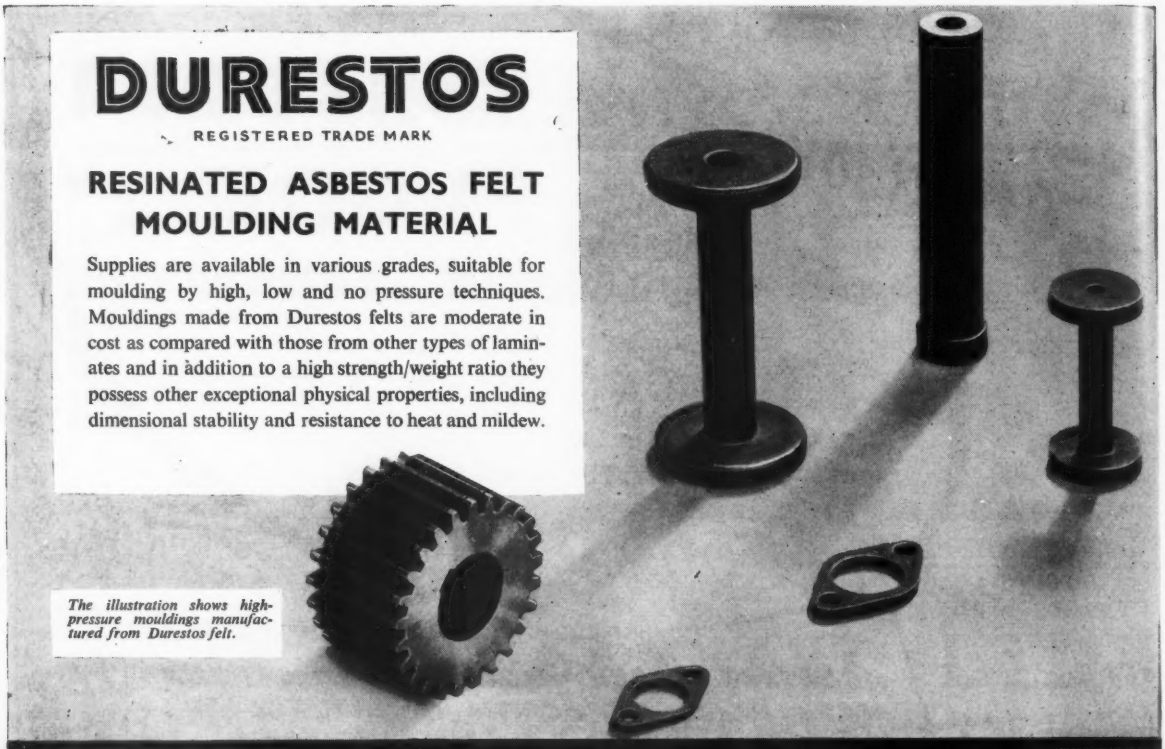

The illustration shows high-pressure mouldings manufactured from Durestos felt.

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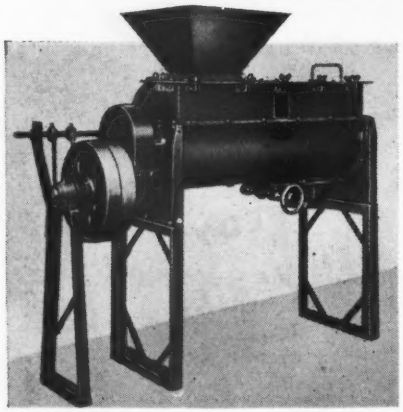

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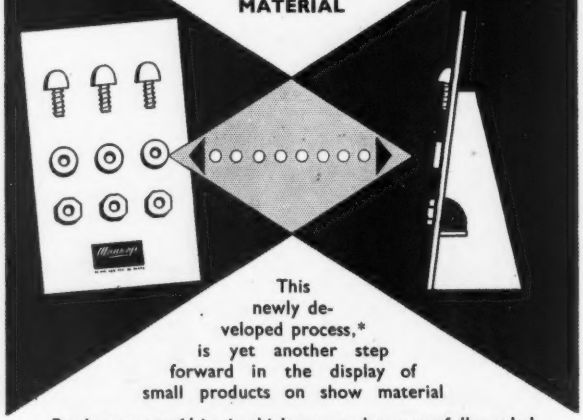

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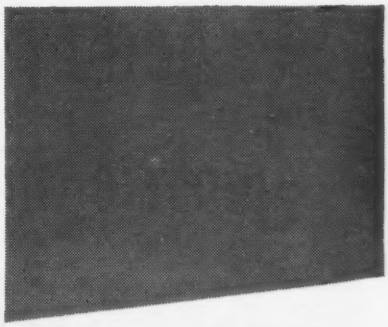

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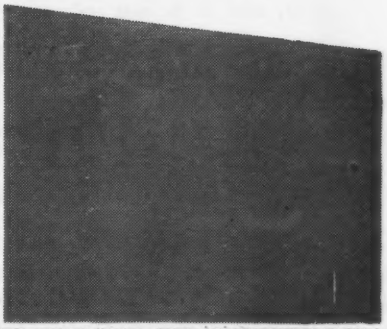

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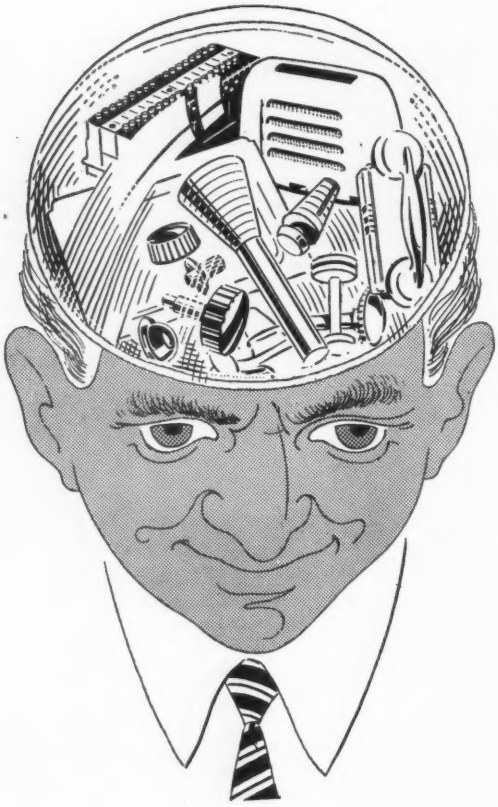

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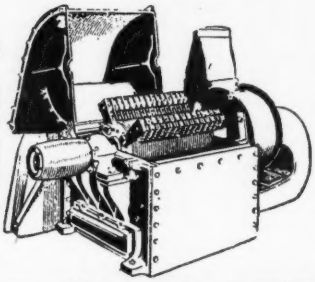

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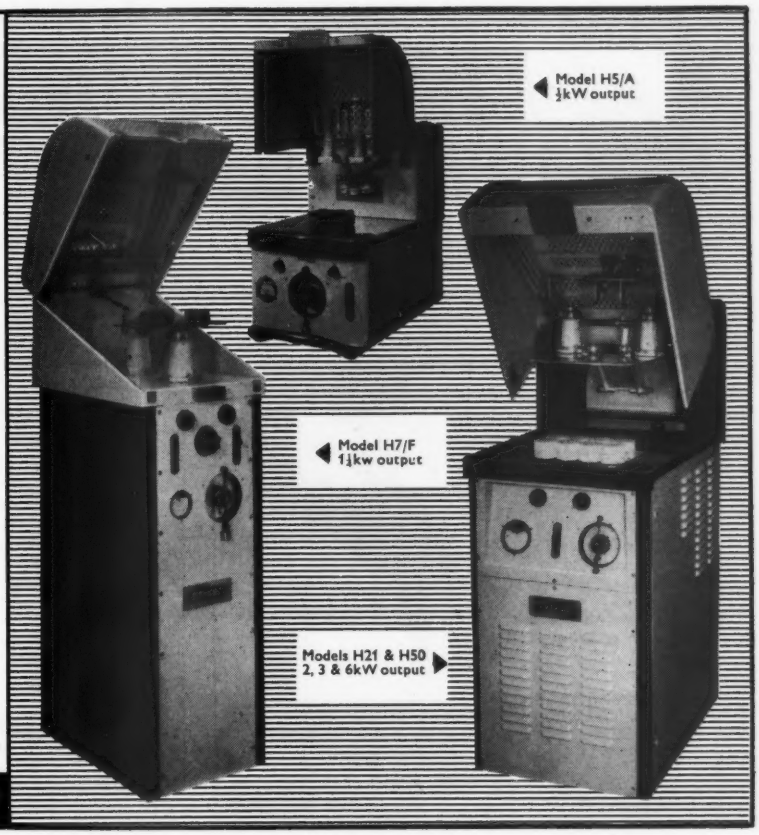

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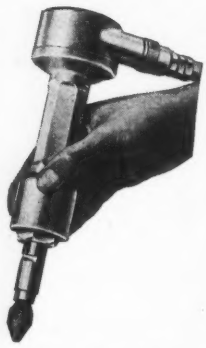

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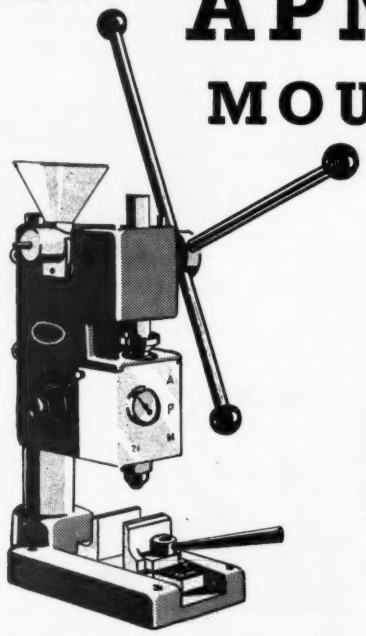

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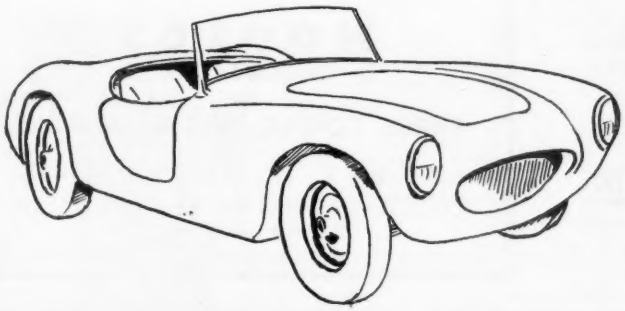

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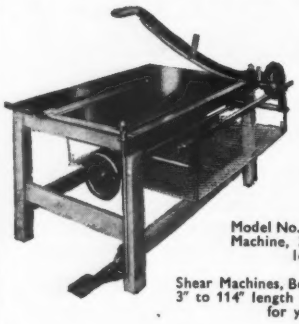

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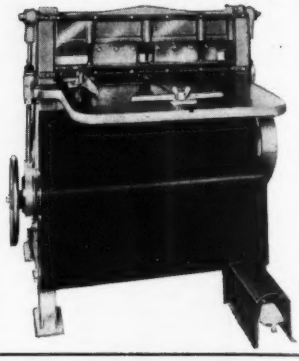

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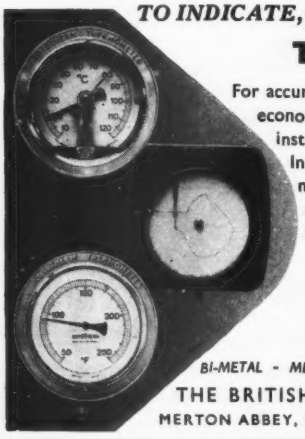

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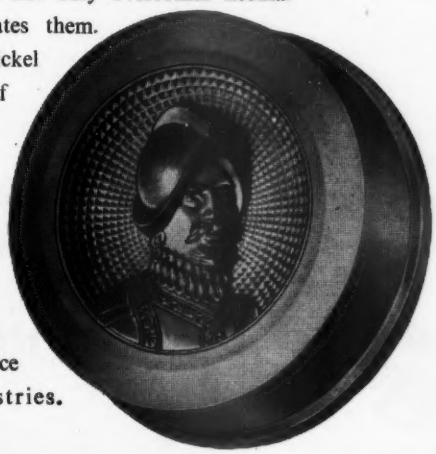

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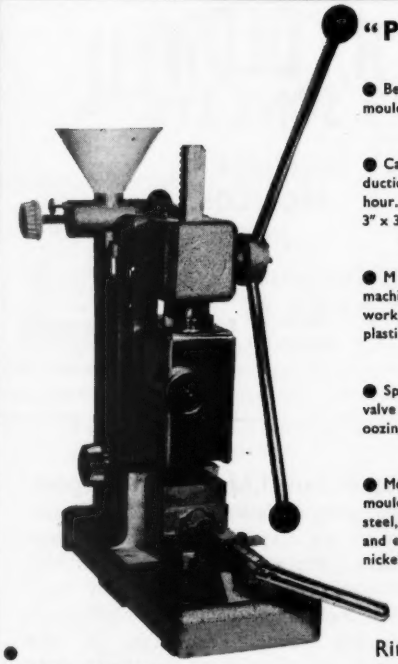

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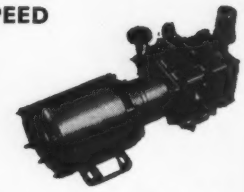

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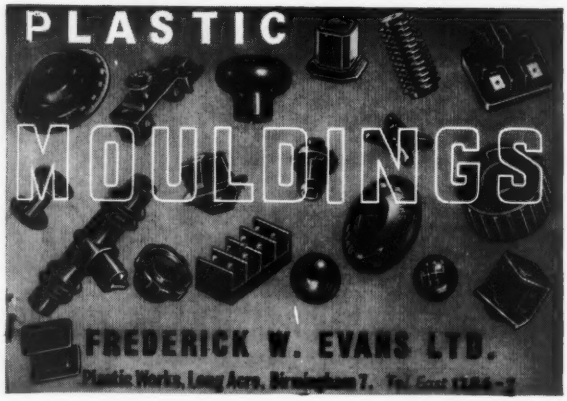

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PRESS DAY.—Classified advertisements for the October issue must be received at Head Office by first post Tuesday, September 27.
Last-minute additions and deletions are accepted by telephone from trade advertisers up to noon. Advertisements received too late for a particular issue are automatically inserted in the succeeding one unless instructions to the contrary are received.

RATES.—4d. per word (minimum 12 words 4/-). Each paragraph charged separately and name and address must be paid for. Semi-displayed setting 35/- per single column inch. Series discounts of 5% for 6, and 10% for 12 consecutive insertions allowed to trade advertisers.

TERMS.—Strictly net and prepayable. Monthly accounts for settlement by the end of the month following insertion are allowed to trade advertisers if satisfactory references are provided.

REMITTANCES.—Cheques and postal orders should be crossed and made payable to TEMPLE PRESS LIMITED and instructions sent addressed to the Manager, "Plastics," Bowling Green Lane, London, E.C.1.

THE PROPRIETORS retain the right to refuse or withdraw advertisements at their discretion and are not responsible for clerical or printers' errors although every care is taken to avoid mistakes.

BOX NUMBERS.—Private advertisers desiring to have replies sent care of "Plastics" may do so on payment of 1/- to cover booking and postage, plus cost of four extra words. To avoid mistakes in forwarding, Box numbers should be carefully and legibly copied and replies sent to Box P000, care of "Plastics," Bowling Green Lane, London, E.C.1.

DEPOSIT SYSTEM.—Facilities are available to readers to purchase advertised goods on approval by depositing the purchase price with "Plastics." Full details on application. Commission 1% (minimum 2/-) on amount deposited.

HEAD OFFICES: Bowling Green Lane, London, E.C.1, England. Telephone: Terminus 3636. Telegrams: "Pressimus, Phone, London."
BRANCH OFFICES: 7, John Bright Street, Birmingham, 1. Telephone: Midland 4117-8. 50, Hertford Street, Coventry. Telephone: Coventry 62464. 1, Brazennose Street, Manchester. Telephone: Blackfriars 5038-9. 12, Renfield Street, Glasgow. Telephone: Glasgow Central 1413.

AUCTIONS

ESTABLISHED 1855.
EDWARD RUSHTON, SON AND KENYON,
INDUSTRIAL VALUERS, AUCTIONEERS AND
FIRE LOSS ASSESSORS,
12 YORK STREET,
MANCHESTER, 2.
Phone, Central 1937-8.
Grams, Russonken, Manchester. zzz-486

BUSINESS OPPORTUNITIES

SILVERING OF PLASTICS. We will train your staff in the silvering technique. Guaranteed formula and production at very low cost. Box P1816, care of "Plastics." 218-38

DESIGNER of simple and inexpensive football form and forecast indicator, invites inquiries from manufacturers. J. Dowell, 27 Bristol Rd., Hull. 218-x7259

PROGRESSIVE COMPANY marketing plastic goods in the United Kingdom with excellent established distribution, offers service to manufacturers as sole distributors. All offers to Acro Marketing, Ltd., 9 Warwick Court, W.C.1. 223-1157

VACUUM FORMING CAPACITY AVAILABLE, together with full facilities for fabricating, engraving and printing of all plastic materials. Omega Plastics, Ltd., Highbridge Rd., Town Quay, Barking, Essex. 223-1158

WE OPERATE the most efficient and extensive distribution service for plastic products in Great Britain, with or without manufacturing facilities. Designers with ideas for exploitation and moulders, etc., having products, particularly those of interest to the hardware trade, requiring nation-wide distribution, should write in confidence to the Managing Director, Box P1327, care of "Plastics." 218-28

BUSINESSES, PREMISES, OFFICES, ETC.

FOR SALE,
MODERN FACTORY PREMISES,
CHESHIRE COUNTY DISTRICT,
ADJACENT TO
MANCHESTER SHIP CANAL,
60,600 SQ. FT.,
including 41,250 sq. ft. on Ground Floor.
(FURTHER 100,000 SQ. FT. WITH ADDITIONAL
LAND AND COTTAGES AVAILABLE
IF DESIRED.)
OFFERS INVITED.
APPLY:—
ISAAC NEILD SON AND LEES,
ESTATE AGENTS,
(Established 1847),
47 MARKET STREET,
MANCHESTER.
Phone, BLA 9309. 218-1

FINANCIAL AND PARTNERSHIP

PATENTEE with novel handbag dry cleaner appliance desires contract with firms interested in manufacturing under licence. Box P1621, care of "Plastics." 218-x1150

MACHINERY, TOOLS AND PLANT

HYDRAULIC. Frazer Mono-radial pumps, new and second-hand in stock. Thompson and Son (Millwall), Ltd., Cuba St., London, E.14. East 1844. zzz-483

PLASTICS MACHINERY.
Hydraulic Presses of all sizes. Injection Machines. Extruders. Mixing Mills. Hydraulic Pumps and Accumulators.
Send your requirements to the specialists.
REED BROTHERS (ENGINEERING), LTD.,
REPLANT WORKS,
CUBA STREET, MILLWALL, E.14.
Phone, East 4081 (five lines). 218-37

VACUUM FORMING PLASTIC MACHINE (YADRAN). Very little used, hire-purchase contract could be taken over, complete £365; moulding area 2 ft. by 2 ft. Box P188, care of "Plastics." 218-32

SIX EDWIN MILLS 4-column Hydraulic Presses for sale. Pressure 3-15 tons, 2-11 tons, 1-20 tons. Platens 15 in. by 15 in. average size. Sold separately. Photo. and full details from F. J. Edwards, Ltd., 359 Euston Rd., London. Euston 4681. 218-18

McLAUGHLIN 180 TONS MOULDING PRESS as new, offers to Elgar 5536. 218-16

HYDRAULIC PRESSES.

Six 1,160-ton upstroke presses by Robertson and Orcher, glanded ram 33¼-in. dia. by 15-in. stroke, four columns 8 in. dia., distance between 7 ft. 1 in. by 17 in., semi guided moving table and head with working area 6 ft. 5 in. by 4 ft., daylight 13¼ in., W.P. 3,000 lb. sq. in. fitted 2 C.I. platens 6 ft. 5 in. by 4 ft. by 4½ in.

Seven 400-ton downstroke presses by Greenwood and Batley, ram 16-in. dia. by 30-in. stroke, W.P. 2 ton sq. in., four columns 5½ in. dia., distance between 22 in. by 17¾ in., fully guided moving table, working area 31¾ in. by 22 in., daylight 54 in.

350-ton self-contained downstroke press by John Shaw, main ram 21-in. dia. by 29-in. stroke, W.P. 1 ton sq. in., four columns 5½ in. dia. distance between 36⅝ in. by 18⅛ in., fully guided moving table, working area 36 in. sq., pr. electric platens 36 in. sq., daylight 33 in., Hele Shaw pump, motorized 400/3/50.

285-ton upstroke multi daylight platen press by Iddon, ram 19-in. dia. by 15-in. stroke, four columns 4½ in. dia., distances between 31½ in. and 13½ in., to head and table are fitted steam heated platens 30 in. sq. by 2 in. thick with intermediate platens giving four daylights of approx. 4¾ in., platen W.P. 100 lb. sq. in. press W.P. 1 ton sq. in.

250-ton upstroke press, ram 18-in., dia. by 15-in. stroke, W.P. 1 ton sq. in., four columns 5⅝ in. dia. distance between 22½ in. by 18 in., semi guided tee slotted table 30 in. by 14 in. by 9¾ in. deep, daylight 14½ in.

200-ton downstroke compression or transfer moulding press by Hydraulic Eng., main piston type ram effective dia. 11-in. by 9¾-in. dia. rod by 12-in. stroke, fixed and moving tables each with working area 30 in. by 21 in. max. daylight 30 in. W.P. 2 tons sq. in.

160-ton downstroke press by E.M.B., ram 12-in. dia. by 13-in. stroke, tee slotted moving tables 26 in. by 19 in., daylight 16 in., ejector or transfer ram 5½ in. dia. by 6½-in. stroke, main pressing power 160 ton, mould breaking power 14 ton, ejector power 35 ton, W.P. 1½ ton sq. in., Towler electraulic pump.

GEORGE COHEN, SONS AND CO., LTD.,
WOOD LANE, LONDON, W.12.
Phone, Shepherd's Bush 2070.
AND
STANNINGLEY, NR. LEEDS.
Phone, Pudsey 2241. 218-29

Machinery, Tools and Plant (contd.)

ALTERATIONS. Diesel sets, electric motors, switch gear, transmission equipment, fluorescent lighting and industrial fittings ex stock, keen prices. Contact G. L. Murphy, Ltd., Manston, near Leeds. zzz-489

HYDRAULIC. Frazer Mono-radial pumps, new and second-hand in stock. Thompson and Son (Millwall), Ltd., Cuba St., London, E.14. East 1844. zzz-302

ONE T.M.A. 4 oz. S.H.4. Windsor Injection Moulding machine in good condition, can be seen working, November, 1949, model, Serial No. 7062, £900. Courtenay, Ltd., 138 Stratford Rd., Birmingham, 11. 218-x6835

16-IN. SINGLE-TUMBLE MIX UNIT with motor speed regulator by P. and L. Miller, cost £121 new 1954, excellent condition. Offers. Rosebud Dolls, Ltd., Raunds, Northants. 218-15

MACHINERY, TOOLS AND PLANT WANTED

COMPRESSION AND INJECTION-MOULDING TOOLS WANTED. Send details of your surplus, obsolete and redundant moulding tools. Box P1311, care of "Plastics." 218-1129

INJECTION-MOULDING MACHINES required. Condition or size not important. Send details. Box P0814, care of "Plastics." 219-1138

EMBOSSING MACHINE for P.V.C. supported leathercloth to take rollers 60 in. wide. Full particulars, price and where may be seen, to Saxton and Wells, 63 Oldham St., Hyde, Cheshire. 218-19

MISCELLANEOUS

EXTEND YOUR TRADE.
Use a trade mark. Consult
Trade Mark Protection Society,
12 Church St., Liverpool. zzz-294

MOULDS

COMPRESSION MOULDS FOR SALE. Consist of household articles, fancy goods, smokers' sundries, toys and games, etc. Would make a very good range in particular for an overseas moulder. Write for full details. Box P186, care of "Plastics." 223-1161

STANDARD 53-mm. jar cap, 18 impressions, two tops; ditto, 63 mm.; four-impression beaker mould with shaker top. Also other moulds, electrical fittings. All in excellent condition. Box P1819, care of "Plastics." 218-x7116

100 COMPRESSION and injection moulds for sale, consisting of household articles, fancy goods, smokers' sundries, tableware and toys. The lot for £4,000.
This is a wonderful range of moulds, in particular for an overseas company about to commence plastic moulding. All moulds at present in Bulawayo, Southern Rhodesia. Box P1810, care of "Plastics." 218-33

MOULDS WANTED

BUTTON MOULDS for Fish Eye 22 !!! and Trouser 22 !!! Urgently required. Good price paid. Box No. P1818, care of "Plastics." 218-39

WANTED to hire or purchase, moulds for polythene table mats. Send sample and details of offer to Industrial Abrasives, Ltd., King's Crescent, Shoreham-by-Sea, Sussex. 218-20

PATENTS

THE PROPRIETOR of British Patent No. 670074, entitled "Improvements in Moulding Machine for Moulding Plastic Articles," offers same for licence or otherwise to ensure its practical working in Great Britain.
Inquiries to Singer, Stern and Carlberg, Chrysler Building, New York 17, N.Y., U.S.A. 218-22

PRODUCTION CAPACITY

POLYSTYRENE AND CELLULOSE ACETATE INJECTION MOULDINGS up to 2 oz. Reliable service. Latest-type machines. Keen co-operation on new lines. W. H. Adamson Plastics, 39 Hedley St., Maidstone. 219-1132

INJECTION MOULDINGS AND PLASTIC COVERING IN ACETATE ALKATHENE, P.V.C., POLYSTYRENE AND DIAKON.
Machined Parts in Brass, Steel and Plastics.
We solicit your inquiries.
F. A. KETCH AND SON, LTD.,
TRENT VALLEY WORKS,
LICHFIELD, STAFFS.
Phone 3591 and 3592. zzz-580

KINGSTON PLASTICS, LTD., Unity Works, Union St., Kingston-on-Thames. Manufacturers of virgin and second-grade cellulose acetate moulding powders, matched to customer's own requirements for colour and flow. Customer's own waste also reprocessed to specified requirements. Sorting and grinding, incorporating magnetic separation of metallic particles of all thermoplastics undertaken. Phone, Kingston 8405. 219-1139

VISIJAR LABORATORIES, LTD.,
THE LEADING CRAFTSMEN IN
" PERSPEX."
PROTOTYPE AND REPETITION.
OFFICIAL I.C.I. STOCKISTS " PERSPEX "
SHEET, TUBE, ROD.
STOCKISTS AND FABRICATORS OF " FORMICA."
149 LONDON ROAD, CROYDON, SURREY.
Phone, Croydon 8228 (two lines). zzz-492

INJECTION MOULDINGS by I.O.G. Industries, Ltd., 41 Marshgate Lane, Stratford, E.15. Maryland 2804. 220-1094

INJECTION MOULDINGS IN THERMOPLASTICS. Moulding in styrene, acrylics and acetate. Design and toolroom facilities available for mould construction. Inquiries invited. J. and E. Courtenay, Ltd., 138 Stratford Rd., Birmingham, 11. 220-1141

PLASTICS (MANCHESTER), LTD.,
BRITAIN'S LEADING STOCKISTS AND DISTRIBUTORS.
SPECIALISTS IN
FABRICATION, INJECTION MOULDING AND ENGRAVING.
11 WHITWORTH STREET,
MANCHESTER, 1.
Central 7081-2 and Central 1000. zzz-493

REPETITION in Ebonite, Erinoid, etc. Capstan lathe work. Temple St., Rugby. Phone 4059. 223-1118

DINES PRODUCTS, Whitehall Lane, Grays, Essex, for injection mouldings. 223-1120

ELCO PLASTICS, LTD.,
HIGH WYCOMBE,
BUCKS.
A.I.D. APPROVED.
MOULDERS, INJECTION COMPRESSION,
TRANSFER, SIDE RAM.
HIGH WYCOMBE 1921-2. zzz-498

SHORT RUNS A SPECIALITY: LONG RUNS A PLEASURE. Low mould cost and overheads. Injection capacity and technical knowledge at your service. Westminster Plastics, Temple Works, 41 Old Church Rd., Chingford, E.4. Silverthorne 7927. 223-1121

COMPRESSION MOULDING CAPACITY available up to 150-ton presses, will accept sub-contracts; prompt deliveries at competitive prices. Write Box P151, care of " Plastics." 220-01138

TUBE LAMINATION AND ENGINEERING, LTD.,
HIGH WYCOMBE,
BUCKS.
MAKERS OF S.R.B.P. TUBE " LAMTUF."
LIGHT ENGINEERS.
HIGH WYCOMBE 1921-2. zzz-499

CHIPPING OF PLASTICS AND GRINDING, screening, mixing and drying of all raw materials undertaken for the trade. Crack Pulverizing Mills, Ltd., Plantation House, London, E.C.3. Man 4405. zzz-487

Production Capacity (contd.)

PLASTICS COMPANY WILL SHORTLY HAVE AVAILABLE
FACILITIES FOR CALENDERING CUSTOMERS' APPROVED P.V.C. MATERIALS.
QUANTITIES ONLY.
WRITE BOX S916, care of STREETS,
110 OLD BROAD STREET,
LONDON, E.C.2. 218-1154

P.V.C. SLUSH MOULDING AND DIPPING. D. R. Cheshire, Ltd., 43 Newington Causeway, S.E.1. Phone, Hop 1816. zzz-296

SMALL FACTORY, equipped with hand-injection machines, fly and power presses, etc., capacity available or suggestions for use invited. London area. Box P1811, care of " Plastics." zzz-301

CAPACITY AVAILABLE for manufacturing compression and injection moulds, together with jigs and general engineering, to customers' own designs, or, alternatively, designed by us. Inquiries for same will receive prompt attention. Elloid Engineering Co., Ltd., Goodacre St., Mansfield, Notts. Phone, Mansfield 2614. zzz-299

INJECTION MOULDING CAPACITY available up to 4 oz. Keenest quotations, prompt deliveries. Fully automatic plant. Islington Plastics, Ltd., 287 Liverpool Rd., London, N.1. Nor 4310. zzz-0501

RAW MATERIAL

PERSPEX! PERSPEX!! PERSPEX!!! Official stockists for I.C.I. acrylic sheets. Sheets cut to your requirements. Fabrication and mounting specialists to the trade:—

S. C. Errington (Hanwell), Ltd., 132a Uxbridge Rd., Hanwell, London, W.7. Phone, Ealing 5288. zzz-40

ALWAYS LARGE STOCKS OF
CASEIN
RODS, TUBES AND SHEETS.
PERSPEX
SHEETS UP TO 1 IN. THICK.
CELLULOSE ACETATE
CATALIN RODS.
S.R. (PLASTICS), LTD.,
93 ALDERSGATE STREET, E.C.1.
Phone, Monarch 4686. 221-1103

P.V.C. RIGID, scrap in lots of several tons for disposal. Box P1812, care of " Plastics." 218-12

NYLON SCRAP, various colours, several tons for disposal. Please inquire Box P1815, care of " Plastics." 218-13

ACETATE MOULDING POWDER, virgin, approx. 8 tons black and 6 tons green for disposal. Write for offer. Box P1817. 218-14

PLASTICS (MANCHESTER), LIMITED,
BRITAIN'S LEADING STOCKISTS
OF
PERSPEX SHEET, ROD, TUBE.
11 WHITWORTH STREET,
MANCHESTER, 1.
Central 7081-2 and 1000. zzz-494

CELLULOSE ACETATE LUMPS, useful colours, cheap for sale. Please contact Box P176, care of " Plastics." 218-5

P.V.C. WHITE EXTRUSION MOULDING POWDER. Large quantities for disposal. Box P183, care of " Plastics." 218-6

CELLULOID SHEETING, natural, new, for sale. Box P185, care of " Plastics." 218-7

POLYSTYRENE AND ACETATE SCRAP for sale. Offers invited. Box P187, care of " Plastics." 218-9

BLACK POLYSTYRENE AND ACETATE for sale. cessed moulding powder at 1s. 6d. per lb. for sale. Herbert Connor, Ltd., 120 Beaufort Park, Falloden Way, London, N.W.11. 218-10

CUEX, LTD., can offer all at prices well below current list:—
Polystyrene.
Cellulose acetate.
Polyethylene.
P.V.C.
Polyvinyl butyral.
Perspex and Diakon.
Send now for details.
Cuex, Ltd., 270 Corporation St., Birmingham. Central 5474. 218-34

PERSPEX, Formica, Warerite, Traffolyte Eng., sheet. Specialists in cut sizes. Immediate delivery.
F. J. Bly and Co., Ltd., Empire Arcade, 370 Upper St., Angel, N.1. Can 5242-3. zzz-300

Raw Material (contd.)

EXTRUSIONS BY MARLEY
BUYERS REQUIRING RIGID AND FLEXIBLE
TUBES AND SECTIONS
IN
THERMOPLASTIC MATERIALS
SHOULD ASK FOR A QUOTATION FROM
MARLEY EXTRUSIONS, LTD.,
DEPT. 119
LENHAM,
MAIDSTONE, KENT.
HARRIETSHAM 381. 218-36

FOR HOME AND EXPORT MARKET. We sell at low prices all plastic scraps, acetate, polystyrene, alkathene, reground powders and reconditioned powders. Apply to Box P1635, care of " Plastics." 218-26

BLACK CELLULOSE ACETATE MOULDING POWDER. We can always supply first grade at 2s. per lb., any quantity. Box P1636, care of " Plastics." 218-25

RAW MATERIAL WANTED

WANTED, Polythene scrap. Write to Box P7416, care of " Plastics." zzz-0322

P.V.C. GARMENT AND HANDBAG OFFCUTS wanted. We collect and pay cash. Brockwell Plastics, Ltd., 50 Hollingbourne Rd., S.E.24. zzz-490

PROMPT CASH OFFERED for virgin and reprocessed cellulose acetate and polystyrene. Give manufacturer's name and backing. Box P873, care of " Plastics." zzz-491

WANTED, large regular supplies of nylon scrap shaving. Hugh Kershaw, Oxenhope, Keighley. 220-1140

WE ARE INTERESTED in buying polystyrene scrap and virgin materials for cash. Box P1127, care of " Plastics." 223-1108

UREA
MOULDERS
WE ARE BUYERS OF UREA WASTE
IN ANY SHAPE OR FORM.
PLEASE CONTACT,
E. DU VERGIER AND CO., LTD.,
13-21 HOXTON STREET,
LONDON, N.1.
Phone, Shoreditch 6451. 218-2

SURPLUS STOCKS of thermosetting and thermoplastic moulding powders wanted. Send details. Box P1727, care of " Plastics." zzz-297

POLYTHENE FILM SCRAP, clear, in quantities wanted. Please offer with particulars and samples to Herbert Connor, Ltd., 120 Beaufort Park, Falloden Way, London, N.W.11. 218-8

SCRAP.
WE BUY
ALL THERMO-PLASTICS. REJECTED MOULDED PIECES. OBSOLETE MOULDING POWDERS, LUMPS, SPRUES AND RUNNERS.
AND PAY HIGHEST PRICES.
J. W. NASH AND CO., LTD.,
27 BEETHOVEN STREET, W.10.
Ladbroke 4655. 218-27

RAW MATERIALS wanted. Polystyrene, polythene, C.A., P.V.C., Diakon, reject moulds, sprues, runners, lumps, etc. Highest price paid. Prompt payment. Also spot lot origin. Box P1020, care of " Plastics." 218-01106

Raw Material Wanted (contd.)

SURPLUS OR REDUNDANT STOCKS WILL BE PURCHASED FOR CASH, ANY QUANTITY CONSIDERED. SEND FULL DETAILS TO:—
LAWRENCE EDWARDS AND CO., 23-25 KENSINGTON PARK ROAD, LONDON, W.11.
Phone, Bayswater 4020. 220-1155

POLYSTYRENE, Diakon, Perspex and Polythene Scrap in quantities wanted. Please offer with particulars and samples to Herbert Connor, Ltd., 120 Beaufort Park, Falloden Way, London, N.W.11. 218-11

ERLANOS, LTD., 93 Aldersgate St., E.C. (Monarch 4686), require Perspex and cellulose offcuts and scrap, clear and coloured; highest prices paid. 229-1159

SITUATIONS VACANT

The engagement of persons answering advertisements in respect of vacant situations must be made through a local office of the Ministry of Labour, or a scheduled employment agency, if the applicant is a man between the ages of 18 and 64 inclusive or a woman between the ages of 18 and 59 inclusive, unless he or she, or the employment, is excepted from the provisions of Notification of Vacancies Order, 1952.

NYLON INJECTION MOULDING. Experienced and capable man to take complete charge EMB machine, just commencing in small engineering firm Manchester, good prospects. Write in confidence, stating age and experience. Box P1725, care of "Plastics." 218-1150

PETROCHEMICALS, LTD., have a vacancy for a Chemist who has specialized in or has industrial experience of colour chemistry in the plastics or other fields.

This position offers interest and scope in existing and new processes. Contributory pension scheme; non-contributory sickness and accident benefit scheme.

Applications in writing quoting Reference Col/47, should be addressed to the Personnel Manager, Petrochemicals, Ltd., Partington Industrial Estate, Urmston, Manchester. 218-1151

TECHNICAL ASSISTANTS, preferably of Inter.B.Sc. standard, are required for work in the British Geon Ltd., laboratories at Barry, South Wales.

The work is concerned with the development of the fabrication of P.V.C. in the Customer Service and Fabrication Group. The work is interesting, the laboratories well equipped and the positions progressive.

Apply in writing to Staff Manager, Hayes Rd., Sully, near Penarth, quoting Ref. G.46. 218-1152

CALENDER CHARGEHAND required P.V.C. works in Scotland; good wages and bonus for right man. Apply Box P172, care of "Plastics." 218-1153

PLASTICS TECHNICAL MANAGER.

One of the principal companies in the plastics industry specializing in the production of compression and injection moulding, extrusion and vacuum forming seeks the services of a technical manager.

Applications are invited from engineers who have an established reputation.

The duties consist of complete control of all technical services as follows:—

(a) Estimating for tools and mouldings.
(b) Control of tool design.
(c) Control of raw materials.
(d) General development work.

This should be considered as a first-class permanent situation commanding top salary for a man of proved ability. Only applicants who can establish ability to fill adequately all the above requirements need apply. Box P182, care of "Plastics." 218-30

Situations Vacant (contd.)

CHIEF ESTIMATOR. Resinoid and Mica Products, Ltd., require the services of a qualified estimator. He must be fully experienced in estimating for all types of compression and injection mouldings.

An attractive salary will be paid, and applicants should write in the first instance, giving full information of experience, to the General Manager, Colonial Works, Mary St., Balsall Heath, Birmingham, 12. 218-17

GENERAL MANAGER required for compression and injection for factory in North London. Applicant should be a specialist on injection moulding and capable of developing this department. Box P1813, care of "Plastics." 218-35

EXTRUSION-P.V.C. AND POLYTHENE CABLES. Charge-hand wanted with full technical knowledge, long experience and drive, small modern shop, good opportunity and conditions for really first-rate man.

Write, stating age, qualifications, previous jobs, references, salary, to Box 507, Reynells', 44 Chancery Lane, London, W.C.2. zzz-298

A PROMINENT PLASTICS MANUFACTURER in the Midlands has a vacancy for a junior sales executive. The duties will comprise the handling of inquiries and liaison with production departments, the post is pensionable, permanent, and offers scope for advancement. Some applicants without this experience would be considered.

Full details should be sent with an indication of the salary required. Box P1814, care of "Plastics." 218-3

MANUFACTURERS of polythene products require first-class representative to call upon ironmongers, builders merchants, local authorities, etc. Expert technical knowledge essential. Excellent opportunity for selected applicant.

Write Box P189, care of "Plastics." 218-31

THE "CHANCE OF A LIFETIME" AT CHILTERN. Chiltern Hunt are looking for men of integrity and ambition who wish to build their career with a young, but progressive company. Vacancies occur both in the sales and production department and are detailed as follows:—

Technical Assistant to manager of film and lamination department. This is an excellent opportunity for a keen man to join an expanding department and to eventually become responsible for its entire operation. A knowledge of extrusion process control and inspection methods is required and applicants should preferably have an engineering qualification with experience in polythene and p.v.c. extrusion.

Assistant to sales manager. Applicants should be between 25-40 and possess experience, preferably in the packaging, paper or plastic industries, together with the ability for acting on their own initiative. Successful applicant will occasionally be required to undertake outside representation and, dependent upon aptitude and progress, consideration will be given should this aspect of sales promotion be preferred.

Applications addressed to: The Personnel Manager, Chiltern Hunt, Ltd., Hemel Hempstead, should contain details of previous experience and full particulars, which will be treated in the strictest confidence. 218-21

HOECHST CHEMICALS, LTD., 27 Regent St., London, S.W.1, have a vacancy for a technical sales representative. The position includes investigation of various products for the plastics industry and the introduction of our new low-pressure polythene, technical sales service for our Hostalit p.v.c. polymer, Hostaflon (P.T.F.C.E.), etc.

This opening gives an excellent opportunity to a young technician with knowledge of injection and compression mouldings, who has initiative and enterprise and prefers to be more active on the technical sales side.

A good salary is offered with profit-sharing bonus, pension scheme and non-contributory private health scheme.

Applications should be addressed to the Managing Director, and will be treated in strictest confidence. 218-24

Situations Vacant (contd.)

DESIGN DRAUGHTSMEN. E. K. Cole, Ltd., Southend, have vacancies in their plastics division for mould design draughtsmen. Experience of injection, transfer and compression mould design essential. Write, stating age, qualifications and experience, to Personnel Manager. 220-23

BRITISH THOMSON-HOUSTON CO., LTD., RUGBY.

Assistant chemists are required in the research laboratory at Rugby for development work involving the preparation and application on a laboratory scale of synthetic resins, varnishes and similar materials. The minimum qualification is a Higher National Certificate.

Applicants are invited to write to the Director of Research, British Thomson-Houston Co., Ltd., Rugby, stating age, qualifications and experience (if any), and quoting the reference SR.2. 220-1156

GODFREY HOLMES (PLASTICS), LTD., have a vacancy for tool designer/draughtsman. Experience in injection and compression moulds essential. Pleasant working conditions, pension fund, permanency.

Write in confidence to Managing Director, Godfrey Holmes (Plastics), Ltd., Wragby, Lincoln. 219-1160

INJECTION MOULDING FOREMAN required, capable of taking charge with eventual managership of expanding injection section of plastics division of old-established company. State age, experience and salary required to Box P184, care of "Plastics." 218-4

SITUATIONS WANTED

DESIGNER with experience of plastics display, screen printing, labour control, seeks position as assistant manager. Box P1820, care of "Plastics." 218-x7059

ANY COMPANY interested in pioneering plastics or rubber industry overseas or company desiring to further develop existing business have the opportunity of engaging two keen and energetic men, 35 years of age.

Joint appointment preferable owing to long business association in research and development; although separate appointments considered.

Excellent background and experience in all branches of plastics and rubber technology—injection and compression moulding, extrusion and blowing, laminates, design and commerce. At present engaged with well-known plastics company.

Willing to make small financial investment if required. Capable administrators. Excellent references. Please reply to Box P1821, care of "Plastics." 218-x7260

TIME RECORDERS

FACTORY TIME RECORDERS. Service rental. Phone, Hop 2230. Time Recorder Supply and Maintenance Co., Ltd., 157-158 Borough High St., S.E.1. 221-1102

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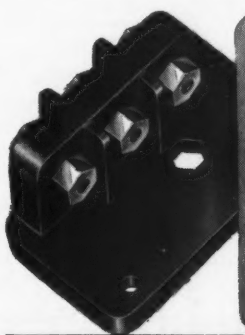

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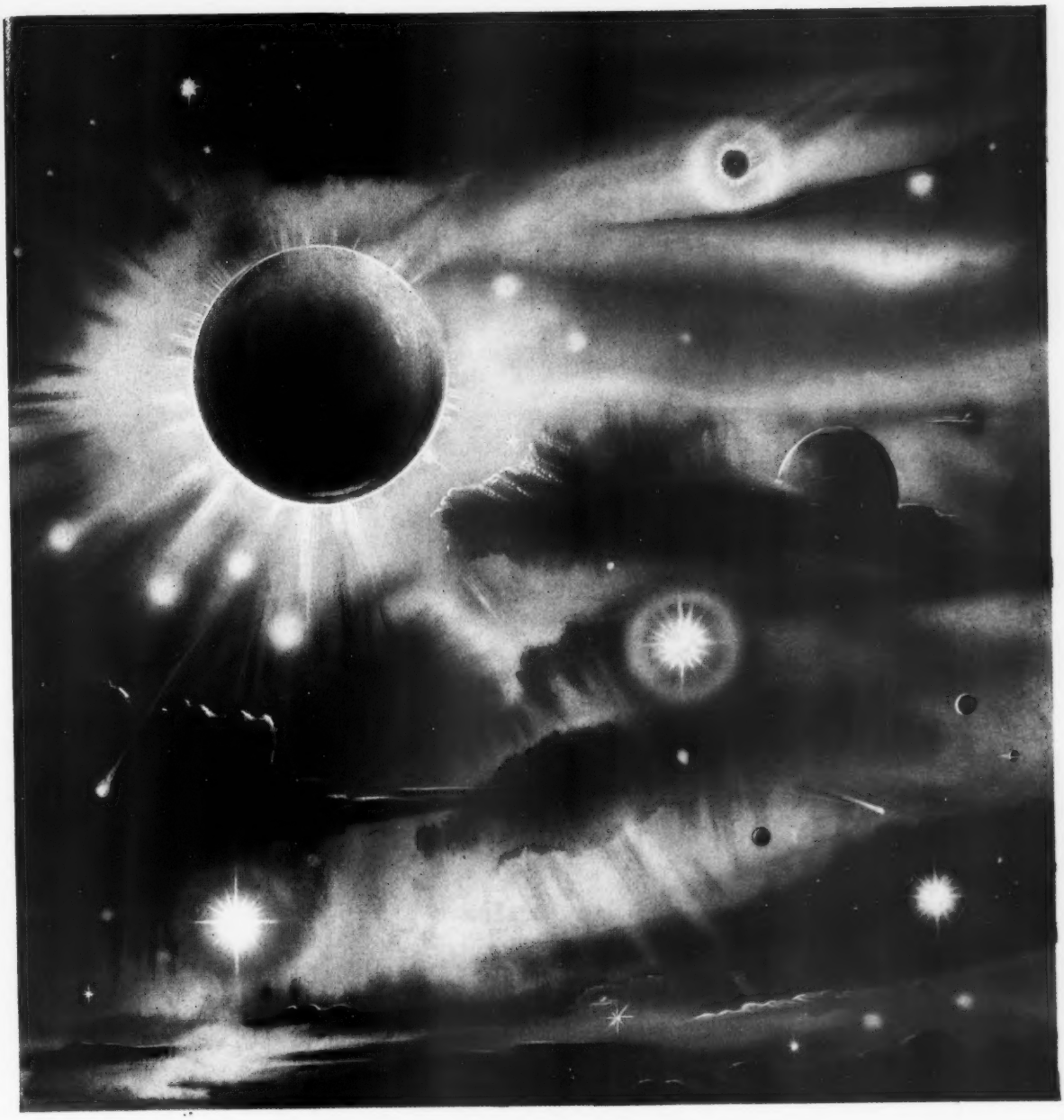

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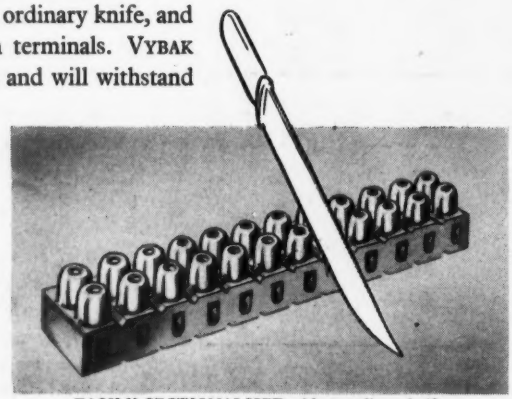

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